NATIONAL MARINE FISHERIES SERVICE
ENDANGERED SPECIES ACT SECTION 7 CONSULTATION
BIOLOGICAL OPINION

Agency: National Marine Fisheries Service

Activity: Sea Turtle Conservation Measures for the Pound Net Fishery in Virginia Waters of the Chesapeake Bay (F/NER/2003/01596)

Conducted by: National Marine Fisheries Service
Northeast Regional Office

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Approved by: [signature]

This constitutes the National Marine Fisheries Service's (NOAA Fisheries) biological opinion on the effects of NOAA Fisheries' implementation of sea turtle conservation measures for the pound net fishery in the Virginia Chesapeake Bay on threatened and endangered species in accordance with section 7 of the Endangered Species Act (ESA) of 1973, as amended (16 U.S.C. 1531 et seq.). This biological opinion is based on information provided in the proposed rule (69 FR 5810, February 6, 2004), public comments received on the proposed rule, the Environmental Assessment/Regulatory Impact Review (EA/RIR), correspondence with the Virginia Marine Resources Commission (VMRC; the state agency responsible for marine fisheries management in Virginia) and the Virginia pound net fishing industry, and available scientific information. A complete administrative record of this consultation is on file at the NOAA Fisheries Northeast Regional Office (F/NER/2003/01596).

CONSULTATION HISTORY

The Virginia pound net fishery operates exclusively in state waters. As such, there has not been a previous Federal fishery management action that would have resulted in the initiation of section 7 consultation under the ESA. However, a section 7 consultation was previously conducted, which considered the impacts of the Virginia pound net fishery on listed species. In 2002, NOAA Fisheries issued an interim final rule that prohibited the use of all pound net leaders measuring 12 inches and greater stretched mesh and all pound net leaders with stringers in the Virginia waters of the mainstem Chesapeake Bay and portions of the Virginia tributaries from May 8 to June 30 each year (67 FR 41196, June 17, 2002). Included in this interim final rule was a year-round requirement for fishermen to report all interactions with sea turtles in their effects of the action that were not previously considered in NOAA Fisheries' 2002 Biological Opinion. Additionally, as the ITS did not anticipate any take in pound net leaders with less than 12 inches stretched mesh, and takes were documented in this mesh size during the spring of 2003, the ITS was exceeded. NOAA Fisheries reinitiated consultation on July 29, 2003, to evaluate the new information and consider the effects of those incidental takes on listed sea turtles.

In addition, NOAA Fisheries published a proposed rule (69 FR 5810, February 6, 2004) that would revise the current management measures for pound net leaders in Virginia in order to protect sea turtles. The measures in the proposed rule included a prohibition of the use of all pound net leaders south of 37° 19.0' N. lat. and west of 76° 13.0' W. long., and all waters south of 37° 13.0' N. lat. to the Chesapeake Bay Bridge Tunnel at the mouth of the Chesapeake Bay, and the James and York Rivers downstream of the first bridge in each tributary, and all leaders with stretched mesh greater than or equal to 8 inches and leaders with stringers outside the aforementioned area, extending to the Maryland-Virginia State line and the Rappahannock River downstream of the first bridge, and from the Chesapeake Bay Bridge Tunnel to the COLREGS line at the mouth of the Chesapeake Bay, from May 6 to July 15 each year. Public comments were accepted until March 8, 2004. Nineteen comment letters (4 in support, 14 in opposition, 1 neutral) were received during the public comment period for the proposed rule. A petition signed by 1,077 individuals was also received requesting that the proposal be withdrawn and terminated. A public hearing was also conducted in Virginia Beach, Virginia, on February 19, 2004, which also enabled NOAA Fisheries to gather public comments. Eleven individuals, three of which also provided written comments, provided spoken comments in opposition to the proposed measures. NOAA Fisheries considered the comments on the proposed rule as part of its decision making process in developing the final rule. Based upon public comments received on the proposed rule, NOAA Fisheries determined that modifications to the proposed measures were necessary and that the closure area should be redefined, mesh size should not be further restricted at this time, and the framework mechanism should be retained (see Description of the Proposed Action section for details). A final rule has been prepared that includes the proposed restrictions with these modifications. This action, the issuance of a rule with sea turtle conservation measures, is a federal action, which also triggers formal consultation.

Note that NOAA Fisheries also discussed interactions between sea turtles and pound net gear with the Commonwealth of Virginia since the last section 7 consultation. On September 3, 2003, VMRC convened a meeting with NOAA Fisheries, representatives from the pound net industry, the Virginia Institute of Marine Science (VIMS), the Virginia Marine Science Museum (VMSM) and the Virginia Department of Game and Inland Fisheries to discuss the 2002 and 2003 pound net leader monitoring results, high spring sea turtle strandings, and potential measures to reduce sea turtle interactions in pound net gear.

Formal consultation on the issuance of additional pound net leader management measures was initiated on December 5, 2003, by the NOAA Fisheries Northeast Regional Office Protected Resources Division (NOAA Fisheries NER PRD).

The year round reporting and monitoring requirements established via the 2002 interim final rule would remain in effect.

NOAA Fisheries determined that the closed area should be redefined based in part on public comments noting that there is a difference between the nearshore and offshore nets along the Eastern shore, and that this difference may impact sea turtle interaction rates, in particular the occurrence of impingements. NOAA Fisheries had originally considered the environmental conditions in the locations where the offshore and nearshore nets are set to be similar, based upon reports from NOAA Fisheries observers and general understanding of the currents in the Chesapeake Bay (e.g., strong along the Eastern shore near the mouth of the Chesapeake Bay). NOAA Fisheries considered those potential differences when reanalyzing the take information, and found that the data support the difference between observed turtle takes in offshore and nearshore nets. In 2002 and 2003, offshore nets accounted for all of the observed impingements ($n=14$) and 8 of the 9 observed entanglements. One dead sea turtle was observed entangled in a nearshore 8 inch stretched mesh leader along the Eastern shore. The difference in takes between the offshore and nearshore nets is statistically significantly different with a chi-square value of 3.841 and $p<0.01$. In 2002 and 2003, there were 345 surveys of nearshore nets and 480 surveys of offshore nets, and 13 surveys did not specify the location. The best available information suggests that the boundary of the closed area should be modified to account for the fact that all but one turtle take were in offshore nets.

NOAA Fisheries also determined that the final rule should not change in the restricted leader mesh size outside the closed area from 12 inches to 8 inches stretched mesh. Based upon additional analysis on impingements and entanglement ratios by NOAA Fisheries, it appears that restricting mesh size to less than 8 inches stretched mesh would not necessarily provide the anticipated conservation benefit to sea turtles. In additional to mesh size, the frequency of sea turtle takes appears to be a function of where the pound nets are set, with pound nets set in certain areas having a higher potential likelihood of takes for a variety of possible reasons, such as depth of water, current velocity, and proximity to certain environmental characteristics or optimal foraging grounds, and may be independent of mesh size. Additional analyses, and perhaps data collection, will be completed that will provide insights into the relationship between mesh size and sea turtle interactions, because at this time, the mesh size threshold that would prevent sea turtle entanglements cannot be determined. As such, NOAA Fisheries is not making an additional modification to leader mesh size and is retaining the mesh size restriction included in the 2002 interim final rule.

The third change from the proposed rule involved retaining the framework mechanism included in the 2002 interim final rule. This final rule does not reduce the allowable leader stretched mesh size to less than 8 inches as proposed, for reasons identified above. Takes have been documented in 8 inches and 11.5 inches stretched mesh, with one of these takes occurring outside the closed area. Therefore, there is the potential for sea turtles to become entangled in leaders less than 12 inches stretched mesh outside the closed area. As such, retaining this measure is necessary to ensure that sea turtles can be protected from additional take should upon stakes or piling with the head ropes or lines above the water. Typically, there are three distinct segments: the pound, which is the enclosed end with a netting floor where the fish entrapment takes place; the heart, which is a net in the shape of a heart that aids in funneling the fish into the pound; and the leader, which is a long straight net that leads the fish offshore towards the pound (Figure 2). There may also be an outer compartment or heart, and pound nets fished in deeper water may have a middle compartment (round pound). Fish swimming along the shore are turned towards the pound by the leader, guided in the heart, and then into the pound where they are removed periodically by devices such as dip nets. Pound net leaders can consist of mesh, stringers, and/or buoys. NOAA Fisheries considers a pound net leader with stretched mesh greater than 12 inches to be a large mesh leader. A stringer leader consists of vertical lines spaced apart in a portion of the leader and mesh in the rest of the leader (Figure 3). Alternatively, a leader that does not have a stringer fishes the first row of mesh at the water surface.

Pound nets are passive fishing devices, as they will trap the fish that swim into the pound. Species of fish that are caught within a net depend upon a variety of factors, including the season and the location of the pound net. Appendix A identifies the species of fish that have been landed using pound net gear in Virginia. In 2002, bait fish, Atlantic croaker, and menhaden comprised 83.2% of the total catch by pound nets (VMRC 2002 fishing data).

Table 1 identifies the metric tons landed in May and June 2002 by gear type in the Virginia Chesapeake Bay, Virginia nearshore state waters, and, for comparison, the federal waters off Virginia. May and June landings are shown because those months typically have the highest number of sea turtle strandings. However, for reasons included elsewhere in this document (e.g., Effects of the Action), the final rule includes leader restrictions from May 6 to July 15. As such, Table 2 denotes the metric tons landed in May, June, and July 2002 by gear type in the Virginia Chesapeake Bay, Virginia nearshore state waters, and, for comparison, the federal waters off Virginia. This data was obtained from the NOAA Fisheries NEFSC Dealer Database.

Landings by pound nets represented approximately 5 percent of the total landings in the Virginia Chesapeake Bay during May and June 2002 (956 metric tons (mt); Table 1), and approximately 3 percent of the total landings from May to July 2002 (1300 mt; Table 2). Based on 2000 to 2002 VMRC data, annual landings per fisherman were 280,996 pounds in the upper portion of the Virginia Chesapeake Bay (the location of the leader mesh size restrictions in the proposed action) and 257,491 pounds in the southern portion of the Chesapeake Bay (the location where all leaders are prohibited in the proposed action). Annual revenues per harvester were $64,483 and $105,298 in the upper and lower region, respectively. Pound net landings from 1990 to 1999 have increased at an annual rate of 8.33 percent, while the annual revenues from pound net landings have increased by 17.31 percent (Kirkley et al. 2001).

Table 2. Chesapeake Bay, state waters, and ocean landings in the State of Virginia for May, June, and July 2002 by gear type.

Virginia						
May to July 2002	**Chesapeake Bay**		**State Waters**		**Ocean**	
Gear Type	Landings (metric tons)	Percent	Landings (metric tons)	Percent	Landings (metric tons)	Percent
Fish Trawl	0	-	0	-	138.0	0.5
Scallop Trawl	0	-	0	-	3759.2	12.5
Beach Seine	273.1	0.6	4.6	0.2	0	-
Gillnet	726.8	1.5	178.7	7.1	180.1	0.6
Purse Seine	44317.0	92.2	1910.3	75.5	6009.9	20.0
Scallop Dredge	0	-	0	-	19915.2	66.2
Pound Nets	1299.6	2.7	0	-	0	-
Fish Pots	10.2	0.02	23.0	0.9	53.4	0.2
Conch Pots	1.1	< 0.01	5.4	0.2	43.4	0.1
Crab Pots	1415.0	2.9	305.6	12.1	0	-
Picks	0	-	91.3	3.6	0	-
Conch Dredge	22.4	0.05	0	-	5.1	0.02
Clam Dredge	0	-	10.8	0.4	0	-
TOTAL	48065.2	100.0	2529.7	100.0	30104.3	100.0

Boundary Definitions for Tables 1 and 2:
Chesapeake Bay = Mainstem Chesapeake Bay, does not include rivers, small bays, or tributaries.
State Waters = All waters out to 3 miles, including seaside bays.
Ocean = All federal waters beyond 3 miles in which catch was landed in Virginia.

Virginia has maintained a limited entry system for pound nets in the mainstem Chesapeake Bay and near reaches of the tributaries since 1994. According to VMRC, only 161 pound net licenses are issued in Virginia, where one license is assigned to each pound net. Annual attrition of licenses results in licenses being transferred to new participants, so it appears that the number of licenses has been relatively stable since 1994. However, due to economic reasons (e.g., expensive fishing gear, labor costs), the number of participants in the pound nets fishery has declined from the 1980s (Mansfield et al. 2001). So while the number of pound nets has apparently decreased since the 1980s, the number of licenses issued (n=161) has been approximately the same since 1994. This suggests that the number of pound nets in the Virginia determined. However, listed species, sea turtles in particular, are not likely to be in Virginia Chesapeake Bay waters outside the area affected by the final rule. As such, the continued operation of the pound net fishery outside the area for which the final rule applies will not be included in the action area or discussed further, as these nets are not likely to adversely affect listed species.

Action Area
The action area for this consultation includes the Virginia waters of the mainstem Chesapeake Bay from the Maryland-Virginia State line (approximately 37° 55' N. lat., 75° 55' W. long.) to the COLREGS line at the mouth of the Chesapeake Bay; the James River downstream of the Hampton Roads Bridge Tunnel (I-64); the York River downstream of the Coleman Memorial Bridge (Route 17); the Great Wicomico River downstream of the Jessie Dupont Memorial Highway Bridge (Route 200); the Rappahannock River downstream of the Robert Opie Norris Jr. Bridge (Route 3); and the Piankatank River downstream of the Route 3 Bridge.

STATUS OF AFFECTED SPECIES

NOAA Fisheries has determined that the action being considered in this biological opinion may affect the following endangered or threatened species under NOAA Fisheries' jurisdiction:

Sea Turtles

Loggerhead sea turtle (*Caretta caretta*)	Threatened
Leatherback sea turtle (*Dermochelys coriacea*)	Endangered
Kemp's ridley sea turtle (*Lepidochelys kempi*)	Endangered
Green sea turtle (*Chelonia mydas*[1])	Endangered/Threatened
Hawksbill sea turtle (*Eretmochelys imbricata*)	Endangered

Fish

Shortnose sturgeon (*Acipenser brevirostrum*)	Endangered

No critical habitat for any of the affected species has been identified in the action area, and as such, no critical habitat will be affected.

Several species of endangered whales, including right whales (*Eubalaena glacialis*), humpback whales (*Megaptera novaeangliae*), and fin whales (*Balaenoptera physalus*) have been documented in Virginia waters, most frequently in offshore areas. It is unlikely that these species would be present in the action area and be impacted by the proposed action. As such, the proposed action is not likely to affect these endangered whales, and this opinion will not further assess of the potential impacts to these species.

This section will focus on the status of the various species within the action area, summarizing information necessary to establish the environmental baseline and to assess the effects of the proposed action. Background information on the range-wide status of these species and a description of critical habitat can be found in a number of published documents including recent

1 Pursuant to NOAA Fisheries regulations at 50 CFR 227.71, the prohibitions of Section 9 of the Endangered Species Act apply to all green turtles, whether endangered or threatened.

southwest Pacific nesting aggregation. Data from 1995 estimated the Japanese nesting aggregation at 1,000 female loggerhead turtles (Bolten et al. 1996). More recent estimates are unavailable; however, qualitative reports infer that the Japanese nesting aggregation has declined since 1995 and continues to decline (Tillman 2000). We have no recent, quantitative estimates of the size of the nesting aggregation in the southwest Pacific, but the nesting aggregation in Queensland, Australia, was as low as 300 females in 1997.

Pacific loggerhead turtles are captured, injured, or killed in numerous Pacific fisheries including Japanese longline fisheries in the western Pacific Ocean and South China Seas; direct harvest and commercial fisheries off Baja California, Mexico; commercial and artisanal swordfish fisheries off Chile, Columbia, Ecuador, and Peru; purse seine fisheries for tuna in the eastern tropical Pacific Ocean; and California/Oregon drift gillnet fisheries. Loggerhead turtle colonies in the western Pacific Ocean have been reduced to a fraction of their former abundance by the combined effects of human activities that have reduced the number of nesting females and reduced the reproductive success of females that manage to nest (e.g., egg poaching).

Atlantic Ocean. Like cetaceans, sea turtles were listed under the ESA at the species level rather than individual populations or recovery units; therefore, any jeopardy determinations need to be made by considering the effects of the proposed action on the entire species. Nevertheless, for the purposes of this section 7 consultation, the Opinion will consider the effects of the proposed action on the specific subpopulations or species groupings that occur in the action area before considering the consequences of those effects on the species as they are listed under the ESA. With respect to loggerhead sea turtles, NOAA Fisheries recognizes five subgroups: (1) a northern nesting subpopulation that occurs from North Carolina to northeast Florida, about 29°N (approximately 7,500 nests in 1998); (2) a south Florida nesting subpopulation, occurring from 29°N on the east coast to Sarasota, Florida on the west coast (approximately 83,400 nests in 1998); (3) a Florida panhandle nesting subpopulation, occurring at Eglin Air Force Base and the beaches near Panama City, Florida (approximately 1,200 nests in 1998); (4) a Yucatán nesting subpopulation, occurring on the eastern Yucatán Peninsula, Mexico (TEWG 2000); and (5) a Dry Tortugas nesting subpopulation, occurring in the islands of the Dry Tortugas, near Key West, Florida (approximately 200 nests per year) (NOAA Fisheries SEFSC 2001). Genetic analyses conducted at these nesting sites since the listing indicate that they are distinct subpopulations (TEWG 2000). Therefore, any action that appreciably reduced the likelihood that one or more of these nesting aggregations would survive and recover would appreciably reduce the species likelihood of survival and recovery in the wild. Consequently, this biological opinion will treat the five nesting aggregations of loggerhead sea turtles as subpopulations whose survival and recovery is critical to the survival and recovery of the species. Loggerheads from any of these nesting sites may occur within the action area. However, the majority of the loggerhead turtles in the action area are expected to have come from the northern nesting subpopulation and the south Florida nesting subpopulation. For the purposes of this BO, NOAA Fisheries will therefore focus on these two subpopulations.

In the western Atlantic, most loggerhead sea turtles nest from North Carolina to Florida and along the gulf coast of Florida. Between 1989 and 1998, the total number of nests laid along the U.S. Atlantic and Gulf coasts ranged from 53,014 to 92,182, annually with a mean of 73,751.

concluded that relatively small decreases in annual survival rates of both juvenile and adult loggerhead sea turtles will adversely affect large segments of the total loggerhead sea turtle population. The survival of hatchlings seems to have the least amount of influence on the survivorship of the species, but historically, the focus of sea turtle conservation has been involved with protecting the nesting beaches. While nesting beach protection and hatchling survival are important, recovery efforts and limited resources might be more effective by focusing on the protection of juvenile and adult sea turtles.

Like other sea turtles, loggerhead hatchlings enter the pelagic environment upon leaving the nesting beach. Loggerhead sea turtles originating from the western Atlantic nesting aggregations are believed to lead a pelagic existence in the North Atlantic Gyre for as long as 7-12 years before settling into benthic environments where they opportunistically forage on crustaceans and mollusks (Wynne and Schwartz 1999). However, some loggerheads may remain in the pelagic environment for longer periods of time or move back and forth between the pelagic and benthic environment (Witzell 2002). Loggerheads that have entered the benthic environment appear to undertake routine migrations along the coast that appear to be limited by seasonal water temperatures. Loggerhead sea turtles are found in Virginia foraging areas as early as April but are not usually found on the most northern foraging grounds in the Gulf of Maine until June. The large majority leave the Gulf of Maine by mid-September but some may remain in Mid-Atlantic and Northeast areas until late fall. Loggerheads appear to concentrate in nearshore and southerly areas influenced by warmer Gulf Stream waters off North Carolina during November and December (Epperly et al. 1995a). Support for these loggerhead movements are provided by the collected work of Morreale and Standora (1998) who showed through satellite tracking that 12 loggerheads traveled along similar spatial and temporal corridors from Long Island Sound, New York, in a time period of October through December, within a narrow band along the continental shelf before taking up residence for one or two months south of Cape Hatteras.

Although foraging grounds contain cohorts from nesting colonies from throughout the Western North Atlantic, loggerhead subpopulations are not equally represented on all foraging grounds. In general, south Florida turtles are more prevalent on southern foraging grounds and their concentrations decline to the north. Conversely, loggerhead turtles from the northern nesting group are more prevalent on northern foraging grounds and less so in southern foraging areas (Table 3; NOAA Fisheries SEFSC 2001; Bass et al. 1998).

Table 3. Contribution of loggerhead subpopulations to foraging grounds

SUBPOPULATION[1]	% CONTRIBUTION TO FORAGING GROUND				
	Western Gulf	Florida	Georgia	Carolinas	North of Cape Hatteras/ Virginia2
South Florida	83%	73%	73%	65-66%	46%
Northern	10%	20%	24%	25-28%	46%
Yucatán	6-9%	6-9%	3%	6-9%	6-9%

[1]- The Florida Panhandle population was not included because it contributes less than 1% in the

Reef and Queensland), New Caledonia, New Zealand, Indonesia, and Papua New Guinea. The abundance of loggerhead turtles on nesting colonies throughout the Pacific basin have declined dramatically over the past 10 to 20 years. Data from 1995 estimated the Japanese nesting aggregation at 1,000 female loggerhead turtles (Bolten *et al.* 1996), but has probably declined since 1995 and continues to decline (Tillman 2000). The nesting aggregation in Queensland, Australia, was as low as 300 females in 1997.

NOAA Fisheries recognizes five subpopulations of loggerhead sea turtles in the western Atlantic based on genetic studies. Although these subpopulations mix on the foraging grounds, cohorts from the northern subpopulation appear to be predominant on the northern foraging grounds. Although nesting data from 1990 to the present for the northern loggerhead subpopulation suggests that nests have been increasing annually (2.8 - 2.9%) (NOAA Fisheries SEFSC 2001), there are confidence intervals about these estimates that include no growth. In addition, over half of the hatchlings produced are males (NOAA Fisheries SEFSC 2001). In contrast, nest rates for the south Florida subpopulation appear to be increasing (approximately 83,400 nests laid in 1998). Over 80% of the hatchlings produced are females. All loggerhead subpopulations are faced with a multitude of natural and anthropogenic effects. Many anthropogenic effects occur as a result of activities outside of U.S. jurisdiction (*i.e.*, fisheries in international waters). For the purposes of this consultation, NOAA Fisheries will assume that the northern subpopulation of loggerhead sea turtles is declining (the conservative estimate) or stable (the optimistic estimate) and the southern Florida subpopulation of loggerhead sea turtles is increasing (the optimistic estimate) or stable (the conservative estimate).

Leatherback Sea Turtle

Leatherback sea turtles are widely distributed throughout the oceans of the world, and are found in waters of the Atlantic and Pacific Oceans, the Caribbean Sea, and the Gulf of Mexico (Ernst and Barbour 1972). Leatherback sea turtles are the largest living turtles and range farther than any other sea turtles species; their large size and tolerance of relatively low temperatures allows them to occur in northern waters such as off Labrador and in the Barents Sea (NOAA Fisheries and USFWS 1995). In 1980, the leatherback population was estimated at approximately 115,000 adult females globally (Pritchard 1982). By 1995, this global population of adult females had declined to 34,500 (Spotila *et al.* 1996).

Although leatherbacks are a long lived species (> 30 years), they mature at a younger age than loggerhead turtles, with an estimated age at sexual maturity of about 13-14 years for females, and an estimated minimum age at sexual maturity of 5-6 years, with 9 years reported as a likely minimum (Zug and Parham 1996) and 19 years as a likely maximum (NOAA Fisheries SEFSC 2001). In the U.S. and Caribbean, female leatherbacks nest from March through July. They nest frequently (up to 7 nests per year) during a nesting season and nest about every 2-3 years. During each nesting, they produce 100 eggs or more in each clutch and thus, can produce 700 eggs or more per nesting season (Schultz 1975). However, a significant portion (up to approximately 30%) of the eggs can be infertile. Thus, the actual proportion of eggs that can result in hatchlings is less than this seasonal estimate. The eggs will incubate for 55-75 days before hatching. Based on a review of all sightings of leatherback sea turtles of <145 cm ccl, In the eastern Pacific Ocean, leatherback turtles are captured, injured, or killed in commercial and artisanal swordfish fisheries off Chile, Columbia, Ecuador, and Peru, purse seine fisheries for tuna in the eastern tropical Pacific Ocean, and California/Oregon drift gillnet fisheries. Because of the limited available data, we cannot accurately estimate the number of leatherback turtles captured, injured, or killed through interactions with these fisheries. However, between 8 and 17 leatherback turtles were estimated to have died annually between 1990 and 2000 in interactions with the California/ Oregon drift gillnet fishery; 500 leatherback turtles are estimated to die annually in Chilean and Peruvian fisheries; 200 leatherback turtles are estimated to die in direct harvests in Indonesia; and before 1992, the North Pacific driftnet fisheries for squid, tuna, and billfish captured an estimated 1,002 leatherback turtles each year, killing about 111 of them each year.

Atlantic Ocean. Evidence from tag returns and strandings in the western Atlantic suggests that adults engage in routine migrations between boreal, temperate and tropical waters (NOAA Fisheries and USFWS 1992). In the U.S., leatherback turtles are found in the action area of this consultation. A 1979 aerial survey of the outer Continental Shelf from Cape Hatteras, North Carolina to Cape Sable, Nova Scotia showed leatherbacks to be present throughout the area with the most numerous sightings made from the Gulf of Maine south to Long Island. Shoop and Kenney (1992) estimated the leatherback population for the northeastern U.S. at approximately 300-600 animals(from near Nova Scotia, Canada to Cape Hatteras, North Carolina) based on aerial survey data.

Leatherbacks are predominantly a pelagic species and feed on jellyfish (i.e., *Stomolophus, Chryaora*, and *Aurelia* (Rebel 1974)), and tunicates (salps, pyrosomas). Leatherbacks may come into shallow waters if there is an abundance of jellyfish nearshore.

Leatherback populations in the eastern Atlantic (i.e., off Africa) and Caribbean appear to be stable, but there is conflicting information for some sites (Spotila, pers. comm) and it is certain that some nesting populations (e.g., St. John and St. Thomas, U.S. Virgin Islands) have been extirpated (NOAA Fisheries and USFWS 1995). Data collected in southeast Florida clearly indicate increasing numbers of nests for the past twenty years (9.1-11.5% increase), although it is critical to note that there was also an increase in the survey area in Florida over time (NOAA Fisheries SEFSC 2001). However, the largest leatherback rookery in the western North Atlantic remains along the northern coast of South America in French Guiana and Suriname. Recent information suggests that Western Atlantic populations declined from 18,800 nesting females in 1996 (Spotila et al. 1996) to 15,000 nesting females by 2000 (Spotila, pers. comm). The nesting population of leatherback sea turtles in the Suriname-French Guiana trans-boundary region has been declining since 1992 (Chevalier and Girondot 1998). Poaching and fishing gear interactions are, once again, believed to be the major contributors to the decline of leatherbacks in the area (Chevalier et al. 2002, Hilterman et al. 2002). While Spotila et al.(1996) indicated that turtles may have been shifting their nesting from French Guiana to Suriname due to beach erosion, analyses show that the overall area trend in number of nests has been negative since 1987 at a rate of 15.0 -17.3 % per year (NOAA Fisheries SEFSC 2001). If turtles are not nesting elsewhere, it appears that the Western Atlantic portion of the population is being subjected to mortality beyond sustainable levels, resulting in a continued decline in numbers of nesting and abraded carapaces, implicating entanglement. Data collected by the NEFSC in 2001 also support that whelk pot gear was involved in a number of reported leatherback entanglements in Massachusetts and New Jersey waters. The Mid-Atlantic blue crab fishery is another potential source of leatherback entanglement. In May and June 2002, three leatherbacks were documented entangled in crab pot gear in various areas of the Chesapeake Bay. In the Southeast, leatherbacks are vulnerable to entanglement in Florida's lobster pot and stone crab fisheries as documented on stranding forms. In the U.S. Virgin Islands, where one of five leatherback strandings from 1982 to 1997 were due to entanglement (Boulon 2000), leatherbacks have been observed with their flippers wrapped in the line of West Indian fish traps (R. Boulon, pers. comm.). Since many entanglements of this typically pelagic species likely go unnoticed, entanglements in fishing gear may be much higher.

Leatherback interactions with the southeast shrimp fishery are also common. The National Research Council Committee on Sea Turtle Conservation identified incidental capture in shrimp trawls as the major anthropogenic cause of sea turtle mortality (Magnuson et al. 1990). Leatherbacks are likely to encounter shrimp trawls working in the nearshore waters off the Atlantic coast as they make their annual spring migration north. Turtle Excluder Devices (TEDs) are used in the southeast shrimp fishery and summer flounder trawl fishery (in certain geographical areas) to minimize sea turtle/fishery interactions. The TED regulations have been modified over the years to ensure sea turtles are being effectively excluded from trawl gear. On February 21, 2003, NOAA Fisheries issued a final rule to amend the sea turtle protection regulations to enhance their effectiveness in reducing sea turtle mortality resulting from trawling in the Atlantic and Gulf Areas of the southeastern United States (68 FR 8456). These regulations included modifications to the TED design in order to exclude leatherbacks and large, sexually mature loggerhead and green turtles.

Gillnet fisheries operating in the nearshore waters of the Mid-Atlantic states are likely to take leatherbacks when these fisheries and leatherbacks co-occur. However, there is very little quantitative data on capture rate and mortality. Data collected by the NOAA Fisheries NEFSC Fisheries Observer Program from 1994 through 1998 (excluding 1997) on drift gillnet fisheries in offshore fisheries from Maine to Florida indicate that a total of 37 leatherbacks were incidentally captured (16 lethally) in drift gillnets set in offshore waters from Maine to Florida during this period. Observer coverage for this period ranged from 54% to 92%. The NOAA Fisheries NEFSC Fisheries Observer Program also had observers on the bottom coastal gillnet fishery which operates in the Mid-Atlantic, but no takes of leatherback sea turtles were observed from 1994-1998. Observer coverage of this fishery, however, was low and ranged from <1% to 5%.

Poaching is not known to be a problem for nesting populations in the continental U.S. However, the NOAA Fisheries SEFSC (2001) notes that poaching of juveniles and adults is still occurring in the U.S. Virgin Islands. Four of five strandings in St. Croix were the result of poaching (Boulon 2000). A few cases of fishermen poaching leatherbacks have been reported from Puerto Rico, but most of the poaching is for eggs.

Leatherback sea turtles may be more susceptible to marine debris ingestion than other species of 11.3 percent per year, allowing cautious optimism that the population is on its way to recovery. For example, data from nests at Rancho Nuevo, North Camp and South Camp, Mexico, have indicated that the number of adults declined from a population that produced 6,000 nests in 1966 to a population that produced 924 nests in 1978 and 702 nests in 1985, then increased to produce 1,940 nests in 1995 and about 3,400 nests in 1999. Total nests for the state of Tamaulipas and Veracruz in 2003 was 8,323 (E. Possardt, USFWS, pers. comm.); Rancho Nuevo alone documented 4,457 nests. Estimates of adult abundance followed a similar trend from an estimate of 9,600 in 1966 to 1,050 in 1985 and 3,000 in 1995. The increased recruitment of new adults is illustrated in the proportion of neophyte, or first time nesters, which has increased from 6 to 28 percent from 1981 to 1989 and from 23 to 41 percent from 1990 to 1994. The population model in the TEWG report projected that Kemp's ridleys could reach the intermediate recovery goal identified in the Recovery Plan, of 10,000 nesters by the year 2020, if the assumptions of age to sexual maturity and age specific survivorship rates plugged into their model are correct. The population growth rate does not appear as steady as originally forecasted by the TEWG, but annual fluctuations, due in part to irregular internesting periods, are normal for other sea turtle populations. Also, as populations increase and expand, nesting activity would be expected to be more variable.

Kemp's ridley nesting occurs from April through July each year. Little is known about mating but it is believed to occur at or before the nesting season in the vicinity of the nesting beach. Hatchlings emerge after 45-58 days. Once they leave the beach, neonates presumably enter the Gulf of Mexico where they feed on available sargassum and associated infauna or other epipelagic species (USFWS and NOAA Fisheries 1992). The presence of juvenile turtles along both the Atlantic and Gulf of Mexico coasts of the U.S., where they are recruited to the coastal benthic environment, indicates that post-hatchlings are distributed in both the Gulf of Mexico and Atlantic Ocean (TEWG 2000). The location and size classes of dead turtles recovered by the STSSN suggests that benthic immature developmental areas occur in many areas along the U.S. coast and that these areas may change given resource quality and quantity (TEWG 2000).

Juvenile Kemp's ridleys use northeastern and mid-Atlantic coastal waters of the U.S. Atlantic coastline as primary developmental habitat during summer months, with shallow coastal embayments serving as important foraging grounds. Ridleys found in mid-Atlantic waters are primarily post-pelagic juveniles averaging 16 inches in carapace length, and weighing less than 44 pounds (Terwilliger and Musick 1995). Next to loggerheads, Kemp's ridleys are the second most abundant sea turtle in Virginia and Maryland waters, arriving in these areas during May and June (Keinath *et al.* 1987; Musick and Limpus 1997). In the Chesapeake Bay, where the juvenile population of Kemp's ridley sea turtles is estimated to be 211 to 1,083 turtles (Musick and Limpus 1997), ridleys frequently forage in submerged aquatic grass beds for crabs (Musick and Limpus 1997). Blue crabs and spider crabs are key components of the Virginia Kemp's ridley diet, as noted during examination of stranded sea turtle stomach contents (Seney 2003). Upon leaving Chesapeake Bay in autumn, juvenile ridleys migrate down the coast, passing Cape Hatteras in December and January (Musick and Limpus 1997). These larger juveniles are joined there by juveniles of the same size from North Carolina sounds and smaller juveniles from New York and New England to form one of the densest concentrations of Kemp's ridleys outside of the Gulf of Mexico (Musick and Limpus 1997; Epperly *et al.* 1995a; Epperly *et al.* 1995b)

Pacific Ocean. In the Pacific Ocean, green sea turtles can be found along the west coast of the United States, the Hawaii islands, Oceania, Guam, the Northern Mariana Islands, and American Samoa. Along the Pacific coast, green turtles have been reported as far north as British Columbia, but a large number of the Pacific coast sightings occur in northern Baja California and southern California (NOAA Fisheries and USFWS 1996). The main nesting sites for the East Pacific green turtle are located in Michoacan, Mexico, and in the Galapagos Islands, Ecuador, with no known nesting of East Pacific green turtles occurring in the United States. Between 1982 and 1989, the estimated nesting population in Michoacan ranged from a high of 5,585 females in 1982 to a low of 940 in 1984 (NOAA Fisheries and USFWS 1996). Current population estimates are unavailable.

Atlantic Ocean. In the western Atlantic, green sea turtles range from Massachusetts to Argentina, including the Gulf of Mexico and Caribbean (Wynne and Schwartz 1999). Green turtles' occurrence are infrequent north of Cape Hatteras, but they do occur in mid-Atlantic and Northeast waters (e.g., documented in Long Island Sound (Morreale 2003) and cold stunned in Cape Cod Bay (NOAA Fisheries unpub. data)). Green turtles were traditionally highly prized for their flesh, fat, eggs, and shell, and directed fisheries in the United States and throughout the Caribbean are largely to blame for the decline of the species. In the Gulf of Mexico, green turtles were once abundant enough in the shallow bays and lagoons to support a commercial fishery. In 1890, over one million pounds of green turtles were taken in the Gulf of Mexico green sea turtle fishery (Doughty 1984). However, declines in the turtle fishery throughout the Gulf of Mexico were evident by 1902 (Doughty 1984).

In the continental United States, green turtle nesting occurs on the Atlantic coast of Florida (Ehrhart 1979). Occasional nesting has been documented along the Gulf coast of Florida, at southwest Florida beaches, as well as the beaches on the Florida Panhandle (Meylan *et al.* 1995). More recently, green turtle nesting occurred on Bald Head Island, North Carolina just east of the mouth of the Cape Fear River, on Onslow Island, and on Cape Hatteras National Seashore. Increased nesting has also been observed along the Atlantic Coast of Florida, on beaches where only loggerhead nesting was observed in the past (Pritchard 1997). Certain Florida nesting beaches have been designated index beaches. Index beaches were established to standardize data collection methods and effort on key nesting beaches. The pattern of green turtle nesting shows biennial peaks in abundance, with a generally positive trend during the ten years of regular monitoring since establishment of the index beaches in 1989, perhaps due to increased protective legislation throughout the Caribbean (Meylan et al. 1995). Recent population estimates for the western Atlantic area are not available.

While nesting activity is obviously important in determining population distributions, the remaining portion of the green turtles life is spent on the foraging and breeding grounds. Juvenile green sea turtles occupy pelagic habitats after leaving the nesting beach. Pelagic juveniles are assumed to be omnivorous, but with a strong tendency toward carnivory during early life stages (Bjorndal 1985). At approximately 20 to 25 cm carapace length, juveniles leave pelagic habitats and enter benthic foraging areas, shifting to a chiefly herbivorous diet but may also consume jellyfish, salps, and sponges (Bjorndal 1997). Some of the principal feeding pastures in the western Atlantic Ocean include the upper west coast of Florida and the

(Hildebrand 1982). The lack of sponge-covered reefs and the cold winters in the northern Gulf of Mexico probably prevent hawksbills from establishing a viable population in this area. In the north Atlantic, small hawksbills have stranded as far north as Cape Cod, Massachusetts (STSSN database). Many of these strandings were observed after hurricanes or offshore storms. Although there have been no reports of hawksbills in the Chesapeake Bay, one has been observed taken incidentally in a fishery just south of the Bay (Anonymous 1992).

Hawksbills feed primarily on a wide variety of sponges but also consume bryozoans, coelenterates, and mollusks. The Culebra Archipelago of Puerto Rico contains especially important foraging habitat for hawksbills. Nesting areas in the western North Atlantic include Puerto Rico and the Virgin Islands.

No takes of hawksbill sea turtles have been recorded in northeast or mid-Atlantic fisheries covered by the NEFSC observer program.

Shortnose Sturgeon

Shortnose sturgeon occur in large rivers along the western Atlantic coast from the St. Johns River, Florida (possibly extirpated from this system), to the Saint John River in New Brunswick, Canada. The species is anadromous in the southern portion of its range (i.e., south of Chesapeake Bay), while northern populations are amphidromous (NOAA Fisheries 1998b). Population sizes vary across the species' range. From available estimates, the smallest populations occur in the Cape Fear (~8 adults; Moser and Ross 1995) and Merrimack Rivers (~100 adults; M. Kieffer, United States Geological Survey, personal communication), while the largest populations are found in the Saint John (~100,000; Dadswell 1979) and Hudson Rivers (~61,000; Bain et al. 1998).

Total instantaneous mortality rates (Z) are available for the Saint John River (0.12 - 0.15; ages 14-55; Dadswell 1979), Upper Connecticut River (0.12; Taubert 1980), and Pee Dee-Winyah River (0.08-0.12; Dadswell et al. 1984). Total instantaneous natural mortality (M) for shortnose sturgeon in the lower Connecticut River was estimated to be 0.13 (T. Savoy, Connecticut Department of Environmental Protection, personal communication). There is no recruitment information available for shortnose sturgeon because there are no commercial fisheries for the species. Estimates of annual egg production for this species are difficult to calculate because females do not spawn every year (Dadswell et al. 1984). Further, females may abort spawning attempts, possibly due to interrupted migrations or unsuitable environmental conditions (NOAA Fisheries 1998b). Thus, annual egg production is likely to vary greatly in this species.

Shortnose sturgeon are benthic fish that mainly occupy the deep channel sections of large rivers. They feed on a variety of benthic and epibenthic invertebrates including molluscs, crustaceans (amphipods, chironomids, isopods), and oligochaete worms (Vladykov and Greeley 1963; Dadswell 1979). Shortnose sturgeon are long-lived (30 years) and, particularly in the northern extent of their range, mature at late ages. In the north, males reach maturity at 5 to 10 years, while females mature between 7 and 13 years.

The major known sources of anthropogenic mortality and injury of shortnose sturgeon include entrainment in dredges and entanglement in fishing gear. Injury and mortality can also occur at power plant cooling water intakes and structures associated with dams in rivers inhabited by this species. Shortnose sturgeon may also be adversely affected by habitat degradation or exclusion associated with riverine maintenance and construction activities and operation of power plants. Entanglement could include incidental catch in commercial or recreational gear as well as directed poaching activities. Shortnose sturgeon are most likely to interact with fisheries in and around the mouths of rivers where they are found. Thus, interactions are more likely to occur in state fisheries or unregulated fisheries than in the EEZ. Interactions are also most likely to occur during the spring migration (NOAA Fisheries 1998b). According to information summarized in NOAA Fisheries (1998b), operation of gillnet fisheries for shad may result in lethal takes of as many as 20 shortnose sturgeon per year in northern rivers. Shortnose sturgeon may be taken in ocean fisheries near rivers inhabited by this species. No comprehensive analysis of entanglement patterns is available at this time, in part due to the difficulty of distinguishing between shortnose and Atlantic sturgeon with the similarity in appearance of these two species. For example, several thousand pounds of "sturgeon" were reported taken in the squid/mackerel/butterfish fishery in 1992; however, this information is not broken down by species.

ENVIRONMENTAL BASELINE

Environmental baselines for biological opinions include the past and present impacts of all state, federal or private actions and other human activities in the action area, the anticipated impacts of all proposed federal projects in the action area that have already undergone formal or early Section 7 consultation, and the impact of state or private actions that are contemporaneous with the consultation in process (50 CFR 402.02). The environmental baseline for this biological opinion includes the effects of several activities that may affect the survival and recovery of threatened and endangered species in the action area. The activities that shape the environmental baseline in the action area of this consultation include vessel operations, fisheries, dredging, and marine pollution/water quality, as well as conservation and recovery actions that have occurred or are occurring in the action area.

Vessel Operations

Potential adverse effects from federal vessel operations in the action area of this consultation include operations of the U.S. Navy (USN) and the U.S. Coast Guard (USCG), which maintain the largest federal vessel fleets, the EPA, the National Oceanic and Atmospheric Administration (NOAA), and the Army Corps of Engineers (ACOE). NOAA Fisheries has conducted formal consultations with the USCG, the USN, and is currently in early phases of consultation with the other federal agencies on their vessel operations. The operation of federal vessels may have resulted in collisions with sea turtles and their subsequent injury or mortality.

Private and commercial vessels also operate in the action area of this consultation and also have the potential to interact with sea turtles, especially those that participate in high speed marine events. These activities have the potential to result in lethal (through entanglement or boat waters. However, depending on the fishery in question, many state permit holders also hold federal licenses; therefore, section 7 consultations on federal actions in those fisheries address some state-water activity. Impacts on sea turtles and shortnose sturgeon from state fisheries may be greater than those from federal activities in certain areas due to the distribution of these species. Nearshore entanglements of turtles have been documented; however, information is not currently available on whether the vessels involved were permitted by the state or by NOAA Fisheries. NOAA Fisheries is actively participating in a cooperative effort with the Atlantic States Marine Fisheries Commission (ASMFC) and member states to standardize and/or implement programs to collect information on level of effort and bycatch of protected species in state fisheries.

While the Environmental Baseline considers all of the fisheries active in Virginia waters throughout the year, this document will concentrate on the fisheries active in the spring only for several reasons. Sea turtle interactions with Virginia fisheries may be highest in the spring (as suggested by high spring strandings). This would result in a worse case scenario of potential sea turtle and fishery interactions occurring in the spring, which is presented in this baseline. Also, the different spring fisheries are relatively complex and are likely to be representative of the type of fisheries that may occur in any given month throughout the year in Virginia. The best available information on Virginia fisheries is also currently available for only these spring months.

As identified previously in Tables 1 and 2, there is a complex mix of fisheries operating in Virginia Chesapeake Bay waters. Appendix B identifies Virginia commercial landings from January through March 2003 and the species targeted, while Appendix C denotes the landings from April through June 2003 (VMRC web site 2003). The remainder of 2003 landings were not available at the time of this document preparation, but July through September 2002 landings are included in Appendix D, and October through December 2002 landings are listed in Appendix E. This landings data is for all Virginia state waters, not only the Chesapeake Bay (the action area). The targeted species are landed by a variety of gear types, including gillnets, pound nets, pots, and haul seines.

In the spring, gillnets in the area target a number of species including black drum, Atlantic croaker and dogfish. The black drum 10-14 inch mesh anchored sink gillnet fishery occurs in state waters, along the tip of the Eastern shore. While depending on fish migrations, this fishery occurs from approximately mid-April to mid-May. These fisheries may take sea turtles given the gear type, but no interactions have been observed during alternative platform observer coverage (approximately 75 hauls) from 2000 to 2003. No large mesh gillnet fishing in the vicinity of the mouth of the Chesapeake Bay occurs from June 1 to June 30; during this time, gillnets with a stretched mesh size greater than 6 inches are prohibited in Virginia's portion of the Chesapeake Bay south of Smith Island (VMRC regulations 2001).

The amount of gillnet effort occurring in the Chesapeake Bay waters during the spring appears to be relatively small (e.g., approximately 2 percent of total Virginia Chesapeake Bay landings (Tables 1 and 2)). Further, aerial surveys were conducted by VIMS in the Virginia Chesapeake Bay and minimal gillnet effort was observed during May and June 2001 and 2002. Most of the

Note that NOAA Fisheries is comprehensively evaluating the impacts of fishing gear types on sea turtles throughout the U.S. Atlantic Ocean and Gulf of Mexico, as part of the Strategy for Sea Turtle Conservation and Recovery in Relation to Atlantic Ocean and Gulf of Mexico Fisheries ((NOAA Fisheries 2001). This strategy should address the incidental capture of sea turtles in fishing gear (pound net gear included) in all areas where this gear is found. Public involvement to help determine the occurrence and frequency of sea turtle and fishing gear interactions as well as appropriate management solutions, if deemed necessary, will be an integral component of this strategy.

Recreational fishermen may also impact sea turtles. Sea turtles have been caught on recreational hook and line gear. For example, from May 24 to June 21, 2003, five live Kemp's ridleys were reported as being taken by recreational fishermen on the Little Island Fishing Pier near the mouth of the Chesapeake Bay. The Virginia Marine Science Museum recovered, treated, and released these animals. There have also been anecdotal reports that several Kemp's ridleys were caught each week earlier in the spring of 2003. These animals are typically alive, and while the hooks should be removed whenever possible and when it would not further injure the turtle, NOAA Fisheries suspects that the turtles are probably often released with hooks remaining.

Dredging Activities

Close coordination is occurring with the ACOE through the section 7 process on both dredging and disposal sites to develop monitoring programs and to minimize the potential for dredging-related impacts. Whole sea turtles and sea turtle parts have been taken in hopper dredging operations in the action area. Dredging operations in Cape Henry Channel, York Spit Channel, and Thimble Shoals Channel (in the Virginia Chesapeake Bay) have incidentally taken sea turtles. The impacts of hopper dredging in these channels on listed species were previously considered via formal section 7 consultations (NOAA Fisheries NER 2002, NOAA Fisheries NER 2003). From July 2000 to October 2003, 54 sea turtles have been taken by Virginia dredge operations. Some of the incidents involved decomposed turtle flippers and/or carapace parts, but most of these takes were fresh dead turtles. As such, hopper dredging in the action area has resulted in the mortality of a number of sea turtles, most of which were loggerheads. There have also been several strandings (e.g., 13 in 2002, 3 turtles in 2003) with injuries consistent with dredge interactions. Dredging in the surrounding area could have influenced the distribution of sea turtles and/or disrupted potential foraging habitat.

While dredging activities in the action area have not documented the incidental take of any shortnose sturgeon to date, dredging activities may also entrain (and subsequently kill) shortnose sturgeon and disrupt their benthic foraging habitat.

Marine Pollution/Water Quality

Within the action area, sea turtles and optimal sea turtle habitat most likely have been impacted by pollution. Marine debris (e.g., discarded fishing line or lines from boats) can entangle turtles in the water and drown them. Turtles commonly ingest plastic or mistake debris for food, as observed with the leatherback sea turtle. The leatherback's preferred diet includes jellyfish, but similar looking plastic bags are often found in the turtle's stomach contents (Magnuson et al. 1990). Given that most of the Chesapeake Bay shoreline is populated, it would not be

These compounds may affect physiological processes and impede a fish's ability to withstand stress. PCBs are believed to adversely affect reproduction in pallid sturgeon (Ruelle and Keenlyne 1993). Ruelle and Henry (1992) found a strong correlation between fish weight $r = 0.91$, $p < 0.01$), fish fork length $r = 0.91$, $p < 0.01$), and DDE concentration in pallid sturgeon livers, indicating that DDE concentration increases proportionally with fish size.

Conservation and Recovery Actions
A number of activities are in progress that ameliorate some of the adverse effects on listed species posed by activities summarized in the Environmental Baseline. Education and outreach activities are considered one of the primary tools to reduce the risk of collision represented by the operation of private and commercial vessels.

NOAA Fisheries has implemented a series of regulations aimed at reducing the potential for incidental mortality of sea turtles in commercial fisheries. In particular, NOAA Fisheries has required the use of TEDs in southeast U.S. shrimp trawls since 1989 and in summer flounder trawls in the Mid-Atlantic area (south of Cape Henry, Virginia) since 1992. While the implementation of TEDs is outside the action area of this consultation, TED use may benefit those turtles found in the Virginia Chesapeake Bay as sea turtles are highly migratory and TEDs must be used in certain trawls near the mouth of the Bay. It has been estimated that TEDs exclude 97% of the turtles caught in such trawls. These regulations have been refined over the years to ensure that TED effectiveness is maximized through proper placement and installation, configuration (e.g., width of bar spacing), floatation, and more widespread use. For instance, on February 21, 2003, NOAA Fisheries issued a final rule to amend the sea turtle protection regulations to enhance their effectiveness in reducing sea turtle mortality resulting from trawling in the Atlantic and Gulf Areas of the southeastern United States (68 FR 8456). These regulations included modifications to the TED design in order to exclude leatherbacks and large, sexually mature loggerhead and green turtles. Note that with the expansion of fisheries to previously underutilized species of fish, trawl effort directed at species other than shrimp or summer flounder -- and that does not meet the definition of a summer flounder trawl as specified in the TED regulations -- may be an undocumented source of mortality for which TEDs should be considered. Additionally, if observer data support the need for extending the existing TED requirements northward, NOAA Fisheries will consider this requirement.

NOAA Fisheries has also developed a TED which can be used in a type of trawl known as a flynet, which is sometimes used in the mid-Atlantic and northeast fisheries for summer flounder, scup, and black sea bass. This TED is currently being tested in flynets. If observer data conclusively demonstrate a need for such TEDs, regulations will be formulated to require use of TEDs in this fishery, once such a device has been perfected.

On December 3, 2002, NOAA Fisheries published restrictions on the use of gillnets with larger than 8 inch stretched mesh, in federal waters (3-200 nautical miles) off of North Carolina and Virginia (67 FR 71895). These restrictions were implemented to reduce the impact of the monkfish and other large-mesh gillnet fisheries on endangered and threatened sea turtles in areas where sea turtles are known to concentrate. As a result, gillnets with larger than 8 inch stretched mesh are prohibited in federal waters north of the North Carolina/South Carolina border at the and USFWS 1992, USFWS and NOAA Fisheries 1992, NOAA Fisheries and USFWS 1993). Note that the recovery plans for both the loggerhead and Kemp's ridley sea turtles are currently undergoing revision.

Summary and Synthesis of the Status of the Species and Environmental Baseline

In summary, the potential for activities that may have previously impacted listed species (dredging, vessel operations, commercial and recreational fisheries, etc.), to affect sea turtles and shortnose sturgeon remains throughout the action area of this consultation. A number of factors in the existing baseline for sea turtles leave cause for considerable concern regarding the status of these populations, the current impacts upon these populations, and the impacts associated with future activities planned by the state and federal agencies. Given the current status of threatened and endangered species in the action area, and the magnitude of known and suspected mortalities affecting these species, it is reasonable to assume that the combined effects of factors existing in the environmental baseline hinder the recovery of all of the species considered in this Opinion. However, for the purposes of this consultation, NOAA Fisheries will consider that:

1. the northern subpopulation of loggerhead sea turtles is declining (the conservative estimate) or stable (the optimistic estimate);
2. the south Florida subpopulation of loggerhead sea turtles is increasing (the optimistic estimate) or stable (the conservative estimate);
3. the population of Kemp's ridley sea turtles is stable (the conservative estimate) or increasing (optimistic estimate);
4. the Atlantic population of green sea turtles is stable (the conservative estimate) or increasing (optimistic estimate);
5. the Atlantic population of leatherback sea turtles is declining (the conservative estimate) or stable (the optimistic estimate); and,
6. the Chesapeake Bay distinct population segment of shortnose sturgeon status is unknown, but considered to be either decreasing (the conservative estimate) or stable (the optimistic estimate).

Additionally, as noted, recovery actions have been undertaken as described and continue to evolve. Although those actions have not been in place long enough for a detectable change in most listed species populations to have occurred, those actions are expected to benefit listed species in the foreseeable future. These actions should not only improve conditions for listed sea turtles and shortnose sturgeon, they are expected to reduce sources of human-induced mortality as well.

EFFECTS OF THE ACTION

Historical Sea Turtle/Pound Net Interactions
High turtle mortalities in late May and early June in Virginia have previously been attributed to entanglement in large mesh pound net leaders in the Chesapeake Bay (Lutcavage 1981; Bellmund et al. 1987). Specifically, studies conducted in the 1980s speculated that pound net entanglement may account for up to 33 percent of sea turtle mortality in the Chesapeake Bay during some summers (Lutcavage and Musick 1985), but more turtles are likely entangled in Virginia pound net leaders and drown than are reported (Lutcavage 1981). A pound net survey in the 1980s documented "many dead loggerheads and one [Kemp's] ridley hung by heads or limbs in area poundnet hedging [leaders]" (Lutcavage 1981). Bellmund et al. (1987) states that entanglements in pound net leaders began in mid-May, increased in early June, and reached a plateau in late June. In 1984, no entanglements were observed after late June. Data collected in 1983 and 1984 found that in 173 pound nets examined with large mesh leaders (defined as >12 to 16 inch stretched mesh), 0.2 turtles per net were found entangled (30 turtles; Bellmund et al., 1987). This study also found that in 38 nets examined with stringer mesh, 0.7 turtles per net were documented entangled (27 turtles). Turtle entanglement in pound nets with small mesh leaders (defined as 8 to 12 inch stretched mesh) was found to be insignificant. It appears that turtles were documented entangled in small mesh leaders during the 1983 and 1984 VIMS sampling seasons, but this report does not identify the number of turtles entangled in small mesh nets that VIMS considered "insignificant". The sampling area was concentrated in the western Chesapeake Bay, with some sampling occurring in other portions of the Virginia Chesapeake Bay.

Surveys conducted in Virginia Chesapeake Bay waters in 1979 and 1980 also found that most pound net leaders that captured sea turtles had large mesh (12 to 16 inches) and were found in the lower Bay (Lutcavage 1981). No turtles were reported entangled in mesh sizes of 8 inches or less, suggesting that some turtles were entangled in mesh between 8 and 12 inches. However, NOAA Fisheries does not have access to those data and this interpretation is speculative. It could be that there were no pound net leaders with mesh ranging from 8 to 12 inches. Lutcavage (1981) also discussed potential turtle entanglement in small mesh leaders: "I believe that any runner [leader] mesh size large enough to accommodate a turtle's fin or head may entangle turtles that swim into it. I observed that smaller mesh size in hedging may snag a turtle carapace but should not immobilize the turtle...It is likely that as sea turtles encounter poundnet mesh, they struggle to escape and further entangle their heads or fins."

While smaller mesh nets (considered here to be less than 12 inches) were speculated to pose an entanglement risk to sea turtles, prior to 2002, the degree of small mesh entanglement in Virginia pound net leaders had not been as adequately documented as entanglement in larger mesh. Small mesh entanglements have been documented in other areas however. Anecdotal information from North Carolina fishermen indicates that turtle entanglement with approximately 8 inch and greater mesh leaders can and has occurred. In the 1980s, North Carolina pound netters switched to mesh smaller than or equal to 7 inches, a coarser webbing (24-30 strand), and floating leaders, largely as a result of interactions with sea turtles in 8 inch and greater mesh leaders, and found that entanglements were reduced. These pound nets are set in shallow, low current waters, which is not the case for many of the pound nets set in the Virginia Chesapeake Bay. While it was considered, data from North Carolina were not used to

Table 3. Entangled sea turtles observed during pound net leader monitoring in 2002 and 2003.

Date	**Species**	**Disposition**	**Leader stretched mesh size**	**Location of entanglement**	**Geographic location[3]**
May 2002	Kemp's ridley	Dead	8"	Neck	Eastern shore, offshore net
May 2002	Loggerhead	Dead	14"	Left front flipper	Eastern shore, offshore net
May 2002	Kemp's ridley	Dead	14"	Left front flipper	Eastern shore, offshore net
May 2002	Loggerhead	Dead	Stringer	Left front flipper	Western Bay, offshore net
May 2003	Loggerhead	Alive	11.5"	Both front flippers	Eastern shore, offshore net
May 2003	Kemp's ridley	Dead	11.5"	Left front flipper	Eastern shore, offshore net
June 2003	Kemp's ridley	Dead	11.5"	Left front flipper	Eastern shore, offshore net
June 2003	Loggerhead	Dead	8"	Left front flipper	Eastern shore, nearshore net
June 2003	Kemp's ridley	Alive	11.5"	Right front flipper	Eastern shore, offshore net

Necropsies were performed on 4 of the 7 dead entangled turtles. One additional Kemp's ridley sea turtle is anticipated to be necropsied (found in May 2003); NOAA Fisheries is waiting for the necropsy results from this animal. The other two dead animals were left in situ to monitor their status. Necropsy results obtained from 3 of the 7 turtles showed that the turtles had adequate fat stores, full stomach and/or intestines, and no evidence of disease. For the case of one of these 3 turtles (Kemp's ridley), a professional necropsy by the Armed Forces Institute of Pathology found that "the animal was active and in good nutritional condition at the time of death" and concluded that entrapment in fishing gear was the cause of death. One of the 4

[3]All but one of these observed entanglements were located within the closed area in the proposed action.

June 2003	Loggerhead	Alive	11.5"	Surface, head and flipper through mesh	Eastern shore, offshore net
June 2003	Loggerhead	Alive	11.5"	2 ft below surface, left front flipper through mesh	Western Bay, offshore net
June 2003	Loggerhead	Alive	8"	3+ ft below surface	Eastern shore, offshore net
June 2003	Loggerhead	Alive	8"	3 ft below surface	Eastern shore, offshore net
June 2003	Loggerhead	Alive	8"	3 ft below surface	Eastern shore, offshore net
June 2003	Kemp's ridley	Alive	11.5"	3 ft below surface	Eastern shore, offshore net

The observation of impingements is noteworthy given that sea turtles would only remain on the leader, untangled, for the duration of the tidal cycle. If an animal was impinged on a leader by the current with its flippers inactive, based on observations of impinged sea turtles, NOAA Fisheries believes that without any human intervention it could either swim away alive when slack tide occurred, become entangled in the leader mesh when trying to free itself, or float away dead if it drowned prior to slack tide. Those dead animals could then strand on nearby beaches, wash into another nearby pound net leader, or drift off with the current. The likelihood that a turtle remains alive after an impingement depends on the stage of the tide cycle and the location of the turtle in the leader. For example, if the turtle becomes impinged at the beginning of the tide cycle and its head is under the surface, it would likely remain that way for several hours and subsequently drown (particularly if it was struggling in the net as turtles were observed to do).

Forced submergence is a concern for sea turtles. Sea turtles forcibly submerged in any type of restrictive gear eventually suffer fatal consequences from prolonged anoxia and/or seawater infiltration of the lung (Lutcavage et al. 1997). A study examining the relationship between otter trawl tow time and sea turtle mortality showed that mortality was strongly dependent on trawling duration, with the proportion of dead or comatose turtles rising from 0% for the first 50 minutes of capture to 70% after 90 minutes of capture (Henwood and Stuntz 1987). However, metabolic changes that can impair a sea turtles ability to function can occur within minutes of a forced submergence. While most voluntary dives appear to be aerobic, showing little if any increases in blood lactate and only minor changes in acid-base status, the story is quite different in forcibly submerged turtles where oxygen stores are rapidly consumed, anaerobic glycolysis is activated, and acid-base balance is disturbed, sometimes to lethal levels (Lutcavage and Lutz 1997). While a public comment on the proposed rule noted that sea turtles in Virginia have been found to dive for durations of 40 minutes under normal conditions, it is unlikely that struggling, physiologically stressed animals in fishing gear would do the same. Forcibly submerged turtles rapidly consume their oxygen stores (Lutcavage and Lutz 1997). In forcibly submerged loggerhead turtles, blood oxygen was depleted to negligible levels in less than 30 minutes (Lutz and Bentley 1985 in Lutcavage and Lutz 1997). Forced submergence of Kemp's ridley sea occurred in certain areas, locations where observer reports and anecdotal information suggest currents are "strong".

Caveats Associated with Sea Turtle/Pound Net Interactions

It should be noted that the pound net monitoring efforts represent a minimum record of potential sea turtle entanglements and/or impingements. The sampling effort was confined to two boats in 2002 and one vessel during 2003, and each net could not be sampled during every tidal cycle, every hour, or even every day. Some impingements, and some entanglements, were likely missed. Further, sea turtle interactions in pound net leaders are difficult to detect. The sea turtles observed in leaders were found at depths ranging from the surface to approximately 6 feet under the surface. The ability to observe a turtle below the surface depends on a number of variables, including water clarity, sea state, and weather conditions. Generally, turtles entangled a few feet below the surface cannot be observed due to the poor water clarity in the Chesapeake Bay. In several instances in 2002 and 2003, due to tide state and water clarity, even the top line of the leader was unable to be viewed.

In 2001 and 2002, side scan sonar was used to attempt to detect sub-surface sea turtle entanglements; no verified sea turtle acoustical signatures were observed during these surveys (Mansfield et al. 2002a; Mansfield et al. 2002b). In 2001, 7 days of side scan sonar surveys were completed from May 24 through August 3 (with no surveys completed from June 24 to July 22 due to weather), for a total of 825 images for the 55 active pound net leaders surveyed (Mansfield et al., 2002a). In 2002, 9 days of surveys were conducted from May 22 to June 27, for a total of 1848 images for the 61 active pound net leaders surveyed (Mansfield et al., 2002b). In 2001 and 2002, surveys were conducted almost equally in the Western Bay and along the Eastern shore. The use of side scan sonar as a means to detect sub-surface sea turtle entanglements may have potential, but additional research on sub-surface interactions is needed. Mansfield et al. (2002a, 2002b) state that a number of factors may influence the use of side scan sonar, including weather, sea conditions, water turbidity, the size and decomposition state of the animal, and the orientation of the turtle in the net. NOAA Fisheries recognizes that survey scheduling was limited by the weather and sea conditions, but considers that side scan survey results may continue to be affected by water turbidity, the size and decomposition state of the animal, and the orientation of the turtle in the net. These issues must be addressed in future surveys before conclusively determining that sea turtles are not captured in pound net leaders sub-surface. NOAA Fisheries conducted forward searching sonar testing in April 2003 to further explore the issue, but due to technical difficulties (e.g., narrow band width, time needed to familiarize staff with equipment and image interpretation, scheduling), testing had to be curtailed while visual monitoring was conducted. Additional sonar testing is anticipated to be conducted in the spring of 2004.

While most of the previously observed sea turtles were found near the surface in NOAA Fisheries surveys, it remains unclear whether the visual surface monitoring biased the location of the take results. Sea turtles may be found throughout the water column given their preferences for water temperature (e.g., generally greater than 11° C) and foraging (e.g., loggerheads and Kemp's ridleys in Virginia waters are primarily benthic foragers). For instance, according to STSSN reports, most stranded turtles in Virginia that have been necropsied in recent years have

It should also be noted that during the public comment period, it was recognized that an 8 inch leader may in fact be slightly smaller than 8 inches, after it is coated and hung in the water. For example, NOAA Fisheries observers measured nets to the nearest 0.125 inches, so a sea turtle entanglement recorded in an 8 inch stretched mesh leader may have in fact been in a leader with 7.95 inches stretched mesh. Whenever NOAA Fisheries mentions that sea turtles have been taken in 8 inch stretched mesh leaders, it refers to those nets that may have been slightly smaller or larger (within 0.125 inches) than 8 inches.

Benefits to Sea Turtles

NOAA Fisheries has sufficient evidence to conclude that there is a localized interaction between sea turtles and pound nets along the Eastern shore of Virginia and in the Western Chesapeake Bay. Sea turtles have been observed in pound net gear along the Eastern shore in recent years. Sea turtles have also been found impinged on and entangled in leaders in the Western Bay, during recent monitoring studies as well as surveys in the 1980s. Entanglements in and impingements on pound net leaders have been documented on leaders with as small as 8 inch stretched mesh. Impingements occur when the sea turtles are held against the net by the current, which could happen with any mesh size (i.e., on leaders smaller than 8 inches stretched mesh) in areas where impingements were previously documented (e.g., offshore nets in the southern portion of the Eastern shore and in the Western Bay). During 2003 monitoring efforts, there were few active pound nets found in the southern Chesapeake Bay outside the Eastern shore and Mobjack Bay areas. The area where leaders would be prohibited in the final rule was defined to exclude those pound nets in locations where sea turtles have never been found impinged, despite monitoring efforts. Only one sea turtle was found entangled in a leader outside the closed area, and that occurred along the Eastern shore in an 8 inch stretched mesh leader. The difference in takes between offshore and nearshore nets is statistically significant ($p<0.01$). The geographical leader prohibition component of the final rule is proposed to prevent turtle entanglements and impingements in pound net leaders (leading to the potential subsequent drowning of sea turtles).

As mentioned, based upon available analysis, NOAA Fisheries is not making an additional modification to the mesh size threshold that would be protective of turtles. It does not appear that further reducing mesh size has a significant conservation benefit to turtles. This statement is based upon the comparison of ratios of entanglements to impingements. The probability of a sea turtle interaction with a leader may in fact be a function of where the net is set (e.g., offshore in swift moving currents), and if leaders with mesh measuring 7 inches can be used in these areas, it is possible that a sea turtle would have the same likelihood of entanglement and impingement. Without additional analysis, and perhaps data collection, NOAA Fisheries is not able to identify the relationship between mesh size and turtle interaction rates. Retaining the status quo leader mesh size restrictions outside the closed area should still serve to protect sea turtles (Bellmund et al. 1987), even though that extent cannot be quantified. It should be noted that sea turtles may continue to be entangled in leaders with less than 12 inches stretched mesh outside the closed area. One turtle was found entangled outside the closed area in two years of monitoring. Additionally, given that gillnets with less than 8 inches stretched mesh have been found to entangle sea turtles (Gearhart 2002), there is the possibility that entanglements in leader mesh smaller than 8 inches stretched mesh could occur. However, the differences between gillnet gear and pound net leaders (e.g., monofilament vs. multifilament material; drift, set, and runaround

Time Frame of the Measures Included in the Final Rule
The dates of the gear restriction in the proposed action were determined from previous sea turtle strandings data collected on Virginia beaches. Strandings are used in this case to indicate when sea turtles begin to enter the Chesapeake Bay. In one year, the first documented stranding was on April 21 (2002), while in another year, sea turtles were not reported on Virginia beaches until May 19 (2001). From 1994 to 2003, the average date of the first reported stranding in Virginia was May 13. However, sea turtle mortality would have occurred before the animals stranded on Virginia beaches. It is unknown exactly how long it takes a sea turtle in Virginia to strand once the mortality incident has occurred, as the stranding would be dependent upon a number of factors including the location of the mortality, wind patterns, and water currents. A one week estimate from the mortality incident to stranding date appears to be realistic for Virginia Chesapeake Bay waters. In order for the pound net restrictions to be in effect by the time sea turtles are entering the Bay and reduce spring sea turtle interactions with pound net leaders, the measures in the final rule must go into effect at least 1 week prior to the stranding commencement date, or on May 6. Information received from the Commonwealth of Virginia in response to the March 29, 2002 proposed rule (67 FR 15160) shows that in approximately 7 years prior to 1994, the date of the first turtle stranding was earlier than May 15. This also supports the implementation of the leader restrictions in early May.

Water temperature data also support the enactment of the proposed measures on May 6. Mansfield et al. (2001) and Mansfield and Musick (2003) state that VIMS analyses estimated that sea turtles migrate into the Chesapeake Bay when water temperatures warm to approximately 16 to 18° C. Cold blooded sea turtles prefer warmer waters, but species occur in waters as cold as 11° C. In fact, in March 1999, an incidental take of a loggerhead sea turtle in the monkfish gillnet fishery off North Carolina occurred in 8.6° C water. Generally, sea turtles frequent waters as cool as 11° C (Epperly et al. 1995a). From 1999 to 2003, the average water temperature on May 6 at the NOAA National Ocean Service Kiptopeke, Virginia station was 15.7° C, with average water temperatures increasing to 16.3° C on May 7 and 17.1° C on May 8. An additional analysis conducted by the NOAA Fisheries Southeast Fisheries Science Center found that in week 18 (April 30 to May 6) and week 19 (May 7 to May 13), approximately 85 percent and 90 percent, respectively, of the area encompassing the mouth of the Chesapeake Bay (from the COLREGS line to the 20 m depth contour) contained sea surface temperatures of 11° C and warmer (NOAA Fisheries, unpub. data, 2003). This indicates that water temperatures around the mouth of the Chesapeake Bay are well within sea turtles' preferred temperature range in early May and, therefore, supports the effective date of the measures included in the final rule.

A previous study in 1983 and 1984 found that sea turtle entanglements in pound net gear increased slowly until early June, then increased sharply and reached a plateau by late June, with few entanglements occurring after June (Bellmund et al. 1987). Since the early 1980s, there has not been a directed pound net monitoring effort from mid-June to July, but monitoring for sea turtle strandings has continued during this time frame. As mentioned, typically the peak of Virginia strandings has been from mid-May to mid-June, with strandings typically remaining at high elevated levels until June 30. However, strandings data show that the peak can occur earlier and later. For instance, in 2003, the stranding peak occurred during the last two weeks of June and strandings remained consistent through the second week of July (e.g., 48 sea turtles stranded

2	0.25	0.5	0.5	38.8	116.5	28	26.1	17.4	18.25	8.4	4.13

NOAA Fisheries used direct observations of sea turtle entanglement in and impingement on the leaders of pound nets as a basis for developing the measures included in the final rule (the proposed action). These direct observations of entanglements in and impingements on pound net leaders during the spring coupled with the fact that there is a high level of strandings in the Virginia Chesapeake Bay during the spring (although a direct cause and effect relationship between the strandings and pound net fishery interactions is not now known) serve as a reasonable basis to concentrate management measures on this fishery during the spring. Certainly, given the high level of strandings in the spring and the direct observations of entanglements and impingements in and on pound net leaders, NOAA Fisheries believes it is judicious to draw the inference that pound net leaders in the area where these strandings occur is a factor in such strandings.

NOAA Fisheries considered regulating pound net leaders in Virginia's Chesapeake Bay during the period of May through November, which would encompass the full time period when sea turtle presence and pound net fishing in the Chesapeake Bay overlap. There is some concern that entanglements could continue throughout the sea turtle residency period in the Chesapeake Bay. However, few direct observations of sea turtle impingement on and entanglement in pound net leaders exist after the spring. Bellmund et al. (1987) found that no sea turtle entanglements were observed after late June in 1984. However, a pound net characterization study by VIMS documented the entanglement of one dead juvenile loggerhead sea turtle in a pound net leader (approximately 11 inches) in October of 2000 (Mansfield et al. 2001). Further, one dead loggerhead was found entangled in a pound net leader in August 2001 (Mansfield et al. 2002a). It is not know if those animals were dead prior to entanglement or if the interaction with the pound net leader resulted in their death.

Further, the level of strandings is substantially diminished during the summer and fall months. With few direct observations of sea turtle entanglement in and impingement on pound net leaders and without high levels of strandings, similar to those documented in the spring, there is not a sufficiently defensible basis at this time to conclude that pound net leaders are responsible for high levels of sea turtle mortality during the summer and fall months. Absent such a conclusion, there is no basis to impose gear restrictions on the Virginia pound net fishery during the full time period of May through November. Based upon the available data on sea turtle entanglements and impingements and stranding patterns, it appears that the greatest potential impact of pound net leaders on sea turtles would occur during May and June, and extend into the first half of July. Again, it should be recognized that entanglements and impingements in pound net gear may occur from mid-July to November nonetheless.

While the potential of turtle entanglement in leaders in the summer and fall is unknown at this time and appears to be small, turtles have been found to become entangled and impinged in this gear type, so there is the potential for mortality to occur in months when sea turtles are present in the Chesapeake Bay. For instance, sea turtles can be found in the Chesapeake Bay from

Kemp's ridleys (n=31) (VIMS unpub. data 2003). Entanglements may occur when a turtle gets any body part (e.g., nail, ragged piece of carapace, extremity) caught on a net, and these head widths demonstrate that a turtle's head could poke through stretched mesh sizes less than 8 inches (4 inches bar), leading to potential entanglement. Gillnets with less than 8 inches stretched mesh have also been found to entangle sea turtles (Gearhart 2002). Note, however, that there are differences between gillnet gear and pound net leaders (e.g., monofilament vs. multifilament material; drift, set, and runaround vs. fixed stationary gear; gilling vs. herding fishing method), which makes a direct mesh size comparison of potential sea turtle take difficult. Sea turtle entanglement in leaders with stretched mesh below 8 inches has not been documented, but future monitoring studies may address this potential occurrence. There may be other factors that influence potential sea turtle entanglement that NOAA Fisheries is not aware of, such as the tautness of the leader or twine size. Until further information is received, NOAA Fisheries recognizes that turtles may potentially become entangled in leaders with varying mesh sizes.

Impingements on pound net leaders with smaller than 12 inches stretched mesh in areas where sea turtles have previously been documented impinged is likely. As sea turtles may become impinged on leaders by the current, the mesh size of the leader would not matter if the net was set in an area where impingements are likely to occur (the area were they have been previously documented). If set in the same area (with high currents), the likelihood of an impingement on a leader with 12 inch mesh compared to a leader with 4 inch mesh would be the same, given our current knowledge of sea turtle impingements on leaders. However, the proposed action would reduce the potential for this to occur, as the areas where impingements have previously been documented are closed to the use of all leaders. NOAA Fisheries does not expect sea turtle impingements on pound net leaders to occur outside the closed area, given the lack of observed impingements on pound net leaders, which appears to be related to geographical location and current strength. Note, however, that while unanticipated, impingements on less than 12 inch mesh leaders could occur outside the closed area.

So while sea turtle takes may continue to occur in less than 12 inches stretched mesh, the proposed action prohibits leaders in the area with the most documented takes. Further, the available analysis does not provide enough evidence to further reduce mesh size, as it may not be the integral factor in influencing sea turtle take rates, and until this can be explored further, the beneficial impact to sea turtles from changing mesh sizes is uncertain. However, if monitoring determines that less than 12 inches stretched mesh leaders are resulting in sea turtle entanglement outside the closed area, then NOAA Fisheries would determine whether to proceed with additional restrictions via the framework mechanism (mid-season) or an additional proposed rule.

As mentioned, NOAA Fisheries is not aware of any instances or reports documenting shortnose sturgeon entangled in pound net leaders of any mesh size. Further, the distribution and seasonality of shortnose sturgeon in Virginia waters is unknown. Nevertheless, should shortnose sturgeon be subject to entanglement in pound net leaders, the species may also become entangled in less than 12 inches stretched mesh leaders. Other fish species have been found entangled in a variety of leader mesh sizes (NOAA Fisheries unpub. data).

concentration of foraging turtles near the mouth of the Potomac River (as suggested by site fidelity to particular nets), or conversely, that the frequency of incidental capture in pounds is consistent throughout the Bay. These theories need to be explored. NOAA Fisheries has no consistent reliable information on captures in pounds in the lower Chesapeake Bay; the information from the Potomac River nets represents the best available data on potential turtle captures in pounds. Further, this information is a minimum estimate of the potential incidental takes in the Potomac and potentially throughout the Chesapeake Bay, as reporting and response to takes may have varied between years.

A notable number of the turtles found in the Potomac River pounds were recaptured later in the season or in future years; approximately 54 of the 457 turtles found in the Potomac River pounds were subsequently recaptured. Of these 54 turtles, the Potomac River pound net fisherman has reported recapturing these turtles on 160 occasions. While most of the turtles were captured only once, those that did return did so over an average of three to four years. VIMS preliminary tracking data suggests that some sea turtles exhibit strong site fidelity to the mouth of the Potomac River and the area where the sampled pound nets are located (Mansfield and Musick, in press).

The majority of the turtles captured in the Potomac River pounds were loggerheads (n=457). However, Kemp's ridley turtles have also been captured, albeit at a much lower level (n=44) (Mansfield and Musick, in press). During some years, 8 or 9 Kemp's ridley turtles were captured, while in other years, only 1 or 2 Kemp's ridley turtles were reported (K. Mansfield, pers. comm.). Over the 20 years of sampling effort, an average of approximately 2 Kemp's ridleys were captured per year. Only two of the 44 Kemp's ridleys have been recaptured (once) since 1980. In addition to their relatively low abundance in Virginia waters, it is possible that few Kemp's ridleys have been captured in these pounds due to the location of the Potomac River nets. These nets are set near the tidal channels, areas where radio tracking data indicate that loggerheads inhabit (Byles 1988 in Mansfield and Musick, in press). Kemp's ridleys have been found to stay within shallower areas less affected by tidal flux, which suggests that Kemp's ridley turtles would be more likely to be found in the pounds of shallow water nets. Until this theory can be supported, the Potomac River pound net information represents the best available data on Kemp's ridley captures in Virginia pounds.

Over the last 20 years, only two green turtles have been captured in the Potomac River pounds. One turtle was found in the mid-1980s, while the other green turtle was captured in 2001. While green turtle capture appears to be relatively infrequent in Virginia pounds, the potential for this take exists.

Sea turtles may be entering the pounds to feed on the fish and crustaceans that may be present. Sea turtles are generally not agile enough to capture finfish under natural conditions, and thus would only consume large quantities of finfish by interacting with fishing gear or bycatch (Mansfield et al. 2002a, Bellmund et al. 1987, Shoop and Ruckdechel 1982). Twenty three of 66 stranded loggerheads necropsied between May and December 2001 contained fish parts, indicating that these animals may have been inhabiting the pounds of pound net gear. A diet analysis of stranded loggerhead and Kemp's ridley sea turtles in Virginia found that the diet of the year, given the lack of previously observed impingements and the environmental conditions in that area.

Based on previous levels of takes in pound nets in the project area, NOAA Fisheries anticipates that up to 5 loggerhead and 1 Kemp's ridley sea turtles per net will be captured annually in the pound portion of pound net gear. There are 161 total pound net licenses issued in Virginia, where one license is assigned to each pound net. Not all of these nets fish in the action area however. According to 2002 VMRC data, 31 fishermen fish approximately 70 pound nets from May 6 to July 15, but this consultation considered the effects of the proposed action year round. NOAA Fisheries conducted a gear survey in the spring of 2003 and identified 101 individual pound nets in the action area, of which 45 were recorded as inactive and 56 were active at the time of the survey. It cannot be determined which of those sites will be active in any given year and any given season, so for the purposes of estimating annual take of sea turtles in pounds, 101 pound nets are considered to be fished in the action area throughout the year. This may be overestimating the number of active pound nets in Virginia waters, but it is difficult to know exactly how many nets will be fished throughout the year based upon the available data. Given the best available data on the number of pounds set throughout the action area (n=101), the resultant total anticipated incidental take is 505 loggerheads and 101 Kemp's ridley sea turtles per year. These takes are anticipated to be live, uninjured animals, with this take resulting from capture and potential harassment.

These incidental takes were estimated by the number of loggerheads and Kemp's ridleys previously taken in the Potomac River pound nets. The number of nets set in the Potomac River has varied slightly among years (between 5 to 7), so for the purposes of this analysis, NOAA Fisheries assumes that an average of 6 nets were fished per year. From 1980 to 1999, the average number of loggerheads taken in the Potomac River pound nets was 31.07 turtles per year (Mansfield and Musick, in press), with an approximate 5 turtles taken per net. In 2003, 101 potential pound net sites were identified in the action area. Given the available information, the anticipated level of annual take in all pounds in the action area is 505 loggerhead sea turtles (=101 pounds * 5 turtles/net). The average number of Kemp's ridleys taken in the Potomac River pound nets was 2.2 turtles per year (=44 turtles/20 years), with an approximate 0.37 turtles taken per net, or 1 turtle per net. This would result in an anticipated level of annual take of 101 Kemp's ridley sea turtles (=101 pounds * 1 turtles/net) for all pounds in the action area. Using the average number of turtles taken in the Potomac River pounds (rather than the maximum in any given year) may account for variability among years and locations throughout the Virginia Chesapeake Bay. Note that if the number of pound nets set throughout the action area changes dramatically in future years, this consultation must be reinitiated to account for those changes to the anticipated incidental take level.

These estimates may be skewed, as the anticipated level of take was determined from data from one fisherman in the Potomac River (northern portion of Virginia waters), and was based upon the average number of turtles taken. In addition, this estimate is based on a total of 101 potential pound nets, even though some of them may not be actively fished. However this is currently the best available data on turtle captures in pounds, and if in the future, new information is obtained that suggests the anticipated take level is inaccurate, NOAA Fisheries may re-assess the leader. While this entanglement may or may not have involved a leatherback turtle, there is no reason to believe that entanglement could not occur in leaders. NOAA Fisheries anticipates one leatherback turtle could be entangled in leaders from July 16 to May 5 each year.

Sea turtles may also be taken in less than 12 inches stretched mesh leaders from May 6 to July 15, the time period of the leader restrictions included in the proposed action and the time period when sea turtle are considered to be most vulnerable to pound net interactions. In May and June of 2002 and 2003, NOAA Fisheries observers documented 8 alive (5 loggerheads, 2 Kemp's ridleys, 1 unknown) and 3 dead (2 loggerheads, 1 Kemp's ridley) sea turtles in leaders with 11.5 inches stretched mesh, and 5 alive (all loggerheads) and 2 dead (1 loggerhead, 1 Kemp's ridley) sea turtles were found in leaders with 8 inches stretched mesh. All but one of these takes were in the closed area of the proposed action; one dead loggerhead was found entangled outside the closed area in a 8 inch stretched mesh leader in June 2003. Observations of pound net leaders occurred throughout the Virginia Chesapeake Bay, and nets were observed outside the closed area (Figure 5). Granted, the number of times a net was observed was dependent upon prior entanglement history, location of the nets (e.g., in high current areas or not), and assumed threat to turtles. Given this information and the limited number of entanglements (and no impingements) outside the closed area despite monitoring coverage, NOAA Fisheries anticipates that one loggerhead will be entangled in a leader with less than 12 inches stretched mesh outside the closed area from May 6 to July 15. This anticipated incidental take may be underestimated, given that animals have been documented entangled in leaders with greater than or equal to 8 inches stretched mesh in certain areas of the Virginia Chesapeake Bay, but the available information supports that one loggerhead will be taken outside the closed area. NOAA Fisheries assumes that the potential for Kemp's ridleys, greens and leatherbacks to be taken in pound net leaders outside the closed area from May 6 to July 15 would the same as for loggerheads. As such, NOAA Fisheries further anticipates that one Kemp's ridley, one green, or one leatherback will be entangled in leaders with less than 12 inches stretched mesh outside the closed area from May 6 to July 15. While entanglements of live turtles may occur, for the purposes of this analysis, NOAA Fisheries assumes that all these takes will result in mortality.

Should hawksbill sea turtles be in the action area, they may interact with pound net leaders. However, based on previous observations, and due to their rare occurrence in the action area and foraging behavior, NOAA Fisheries does not anticipate that hawksbill sea turtles will be captured by pounds or become entangled in leaders in the Virginia Chesapeake Bay. Due to their rare occurrence in the action area and lack of documented takes, NOAA Fisheries does not anticipate shortnose sturgeon to be taken in pound net gear or become entangled in leaders. Shortnose sturgeon have been found in pounds in Maryland waters, but NOAA Fisheries has no data suggesting that those takes occur in the Virginia Chesapeake Bay. If in the future, new information suggests otherwise, NOAA Fisheries will re-assess the anticipated amount of shortnose sturgeon take during the operation of the pound net fishery.

Loggerhead sea turtles. Like other long-lived sea turtles, loggerheads delay maturity to allow individuals to grow larger and produce more offspring. As discussed in the Status of the Species section, more offspring may compensate for the high natural mortality in the early life stages; i.e., mortality rates of eggs and hatchling are generally high and decrease with age and growth.

long term survival of the population. It is likely that some turtles entangled in leaders will be from the northern subpopulation and some from the southern subpopulation.

Even if the loggerhead turtles anticipated to be entangled and/or impinged and killed in pound net leaders were juvenile or reproductive females from the northern subpopulation, the loss of up to 2 loggerheads in Virginia is not anticipated to have a detectable effect on the numbers or reproduction of the affected subpopulation, and therefore is not expected to appreciably reduce the likelihood of survival and recovery of the species. Again note that most of the anticipated incidental take associated with the proposed action consists of live uninjured sea turtles, which should not result in a large negative impact to the population.

Kemp's ridley sea turtles. The biology of Kemp's ridleys also suggests that losses of juvenile turtles can have a magnified effect on the survival of this species. Note that most of the Kemp's ridleys captured by pound net gear each year will be live turtles and will not likely be subject to injury or mortality. As such, these takes from capture will not likely impact the recovery of the Kemp's ridley population. However, the take of Kemp's ridleys could result in mortality through entanglement or impingement in leaders. The death of 2 Kemp's ridley sea turtles (1 from leader entanglement or impingement from July 16 to May 5, and 1 from leader entanglement outside the closed area from May 6 to July 15) would represent a loss of approximately 0.07 percent of the population. Similar to information available for loggerheads, these are conservative estimates since the loss of Kemp's ridley sea turtles during the proposed activity is not likely limited to adult females, the only segment of the population for which NOAA Fisheries has any population estimates. Past spring strandings data indicate a large number of stranded turtles in Virginia are juveniles. Even if the Kemp's ridleys anticipated to be entangled and/or impinged and killed were reproductive females, this loss is not anticipated to have a detectable effect on the numbers or reproduction of the affected population and therefore is not expected to appreciably reduce the likelihood of survival and recovery of the species. Again note that most of the anticipated incidental take associated with the proposed action includes live sea turtles, which should not result in a large negative impact to the population.

Green sea turtles. Population estimates for the western Atlantic green sea turtles are not available. However, nesting beach data collected on index beaches since 1989 have shown a general positive trend. While the occurrence of green turtles in the action area would be infrequent, NOAA Fisheries anticipates that 1 green turtle may be taken alive in pounds set in the Virginia Chesapeake Bay, 1 green turtle could be entangled or impinged and killed in a leader from July 16 to May 5, and 1 green turtle could be entangled and killed in a leader with less than 12 inches stretched mesh from May 6 to July 15. At this time, the effects of the lethal incidental take of 2 green sea turtles each year on the population are not known, but this level of take is not likely to represent a significant loss to the population. Given the low numbers of anticipated take and the estimated population size, this loss is not expected to appreciably reduce the likelihood of survival and recovery of the species.

Leatherback sea turtles. Population estimates for the western Atlantic leatherback sea turtles are not available. However, the number of female leatherbacks on some nesting beaches have increased, while on others they have decreased. While the occurrence of leatherback turtles in the lack of hawksbill sea turtles and shortnose sturgeon documentation in the pounds or entangled in pound net leaders, NOAA Fisheries does not anticipate any hawksbill sea turtles or shortnose sturgeon will be taken in conjunction with the proposed activities.

CUMULATIVE EFFECTS

Cumulative effects, as defined in the ESA, are those effects of future state or private activities, not involving Federal activities, that are reasonably certain to occur within the action area of the Federal action subject to consultation. Future federal actions that are unrelated to the proposed action are not considered in this section because they require separate consultation pursuant to section 7 of the ESA.

Natural mortality of endangered species, including disease (parasites) and predation, occurs in Mid-Atlantic waters and will likely continue in the future. Sources of human-induced mortality and/or harassment of listed species in the action area include incidental takes in state-regulated fishing activities, private vessel interactions, marine debris and/or contamination effects.

Future commercial and recreational fishing activities in state waters may take several protected species. However, it is not clear to what extent these future activities would affect listed species differently than the current state fishery activities described in the Environmental Baseline section. NOAA Fisheries expects these commercial and recreational fishing activities to continue in the future, and while it cannot be certain, it is expected that in the future, the fisheries will affect protected resources to the same extent in years past. As such, the potential for interactions with listed species will continue.

As noted in the Environmental Baseline section, private vessel activities in the action area may adversely affect listed species in a number of ways, including entanglement, boat strike, or harassment. It is not possible to predict whether additional impacts from these private activities will occur in the future. In other areas of the Northeast, various initiatives have been planned to expand or establish high-speed ferry service. At this time, NOAA Fisheries is not aware of high-speed ferry services planned for the action area. NOAA Fisheries will continue to monitor the development of the high speed vessel industry and its potential threats to listed species and critical habitat. In the future, NOAA Fisheries will attempt to quantify the impacts of vessel interactions with sea turtles in the action area.

Excessive turbidity due to coastal development and/or construction sites could also influence sea turtle foraging ability. As mentioned previously, turtles are not very easily directly affected by changes in water quality or increased suspended sediments, but if these alterations make habitat less suitable for turtles and hinder their capability to forage, eventually they would tend to leave or avoid these less desirable areas (Ruben and Morreale 1999). Most of the Chesapeake Bay watershed is developed and it is likely that contamination impacts from point and non-point sources will continue in the future.

Marine debris (e.g., discarded fishing line, lines from boats, plastics) can entangle turtles in the

the amount of take on the population is conservative since the loss of turtles from leader entanglement/impingement is not likely limited to adult females, the only segment of the population, or subpopulation, for which NOAA Fisheries has any population estimates. Even if all of the turtles anticipated to be entangled or impinged and killed were juveniles or reproductive females, NOAA Fisheries does not anticipate these losses to have a detectable effect on the numbers or reproduction of the affected population or subpopulation, and therefore is not expected to appreciably reduce the likelihood of survival and recovery of loggerhead, Kemp's ridley, green, or leatherback sea turtles.

CONCLUSION

After reviewing the best available information on the status of endangered and threatened species under NOAA Fisheries jurisdiction, the environmental baseline for the action area, the effects of the action, and the cumulative effects, it is NOAA Fisheries' biological opinion that NOAA Fisheries implementation of sea turtle conservation regulations for the Virginia pound net fishery (including the issuance of a final rule that restricts the use of certain pound net leaders in the Virginia Chesapeake Bay from May 6 to July 15, and establishes a framework mechanism, year round monitoring of pound net gear and reporting of any incidental take of sea turtles in pound net gear) may adversely affect but is not likely to jeopardize the continued existence of the loggerhead, leatherback, Kemp's ridley, green, or hawksbill sea turtle, or shortnose sturgeon. Because no critical habitat is designated in the action area, none will be affected by the proposed action.

INCIDENTAL TAKE STATEMENT

Section 9 of the ESA and Federal regulations pursuant to section 4(d) of the ESA prohibit the take of endangered and threatened species, respectively, without special exemption. Take is defined as to harass, harm, pursue, hunt, shoot, wound, kill, trap, capture or collect, or to attempt to engage in any such conduct. Harm is further defined by NOAA Fisheries to include any act which actually kills or injures fish or wildlife. Such an act may include significant habitat modification or degradation that actually kills or injures fish or wildlife by significantly impairing essential behavioral patterns including breeding, spawning, rearing, migrating, feeding, or sheltering. Incidental take is defined as take that is incidental to, and not the purpose of, the carrying out of an otherwise lawful activity. Under the terms of section 7(b)(4) and section 7(o)(2), taking that is incidental to and not intended as part of the agency action is not considered to be prohibited under the ESA provided that such taking is in compliance with the terms and conditions of this Incidental Take Statement.

The measures described below are non-discretionary, and must be undertaken so that they become binding conditions for the exemption in section 7(o)(2) to apply. Failure to implement the terms and conditions through enforceable measures, may result in a lapse of the protective coverage of section 7(o)(2).

When a proposed NOAA Fisheries action which may incidentally take individuals of a listed species is found to be consistent with section 7(a)(2) of the ESA, section 7(b)(4) of the ESA

NOAA Fisheries further anticipates that the following level of incidental take will occur in pound net leaders with less than 12 inches stretched mesh from May 6 to July 15 each year:

- No more than 1 loggerhead,
- No more than 1 Kemp's ridley,
- No more than 1 green, or
- No more than 1 leatherback sea turtle.

These takes are assumed to result in sea turtle mortality. If the take of any of these sea turtle species be exceeded, this consultation must be reinitiated.

No incidental take for hawksbill sea turtles is anticipated as this species is uncommon in the action area and there have been no documented interactions with pound net gear. If information obtained in the future suggests otherwise, this level of anticipated incidental take will be modified.

The distribution of shortnose sturgeon in Virginia waters is relatively unknown. While NOAA Fisheries must employ a conservative approach to management and consider the species to be in the area, it is difficult to determine the abundance of this species in the action area and how the proposed project will impact shortnose sturgeon. Due to the lack of information about distribution in Virginia waters and the low likelihood that shortnose sturgeon will interact with pound net gear in Virginia, no incidental take will be exempted for shortnose sturgeon at this time. If information obtained in the future suggests otherwise, this level of anticipated incidental take will be modified.

Effect of the Take
In the accompanying Biological Opinion, NOAA Fisheries evaluated the effects of this level of anticipated take on the above listed species. NOAA Fisheries has determined that these interactions, should they occur, are not likely to jeopardize the continued existence of these species, or destruction or adverse modification of critical habitat.

Reasonable and Prudent Measures
NOAA Fisheries has determined that the following reasonable and prudent measures are necessary and appropriate to minimize impacts of incidental take of sea turtles. Although no takes of other listed species are authorized at this time, these measures must be undertaken in a manner which ensures detection of takes of these other species so that appropriate reinitiation action can be taken.

1. NOAA Fisheries must provide adequate guidance to pound net fishers such that any sea turtle incidentally taken is handled with due care, observed for activity, and returned to the water outside the pound and away from vessel activities.

Virginia stranding network members (for rehabilitating turtles) include Mark Swingle and/or Susan Barco at the Virginia Marine Science Museum [(757)437-4949], and Jack Musick at the Virginia Institute of Marine Science [(804)684-7313]. Mark Swingle/Susan Barco and/or Dana Hartley (NOAA Fisheries Stranding Network Coordinator: (508) 495-2090) should also be contacted immediately for any marine mammal injuries or mortalities.

4. NOAA Fisheries must conduct or fund scientific experiments to evaluate the potential for alterative pound net leader designs to be employed in Virginia Chesapeake Bay waters. Such experiments may include research and development of new alternatives or testing of gear modifications, and efforts should be made to work cooperatively with the industry.

NOAA Fisheries anticipates that no more than 505 loggerhead, 101 Kemp's ridley, and 1 green sea turtle, will be captured annually in all pounds set in the action area. These takes are anticipated to be live, uninjured animals. No incidental take of leatherback sea turtles in the pounds is anticipated. NOAA Fisheries anticipates that no more than 1 loggerhead, 1 Kemp's ridley, 1 green, or 1 leatherback sea turtle will be either entangled or impinged in leaders from July 16 to May 5 each year. NOAA Fisheries anticipates that 1 loggerhead, 1 Kemp's ridley, 1 leatherback, or 1 green sea turtle will be entangled in leaders outside the closed area with less than 12 inches stretched mesh from May 6 to July 15 each year. For the purposes of this analysis, these entanglements are considered to result in sea turtle mortality. No incidental take of hawksbill sea turtles or shortnose sturgeon is anticipated. The reasonable and prudent measures, with their implementing terms and conditions, are designed to minimize the impact of incidental take that might result from the proposed action. If, during the course of the project, this level of incidental take is exceeded, the additional level of take would represent new information requiring reinitiation of consultation and review of the reasonable and prudent measures provided above.

CONSERVATION RECOMMENDATIONS

In addition to Section 7(a)(2), which requires agencies to ensure that proposed projects will not jeopardize the continued existence of listed species, Section 7(a)(1) of the ESA places a responsibility on all federal agencies to "utilize their authorities in furtherance of the purposes of this Act by carrying out programs for the conservation of endangered species". Conservation Recommendations are discretionary activities designed to minimize or avoid adverse effects of a proposed action on listed species or critical habitat, to help implement recovery plans, or to develop information.

1. NOAA Fisheries should expand education and outreach and establish an award program to promote incentives to assist in prevention activities. Outreach focuses on providing information to fishermen and the public about conditions, causes and solutions to protecting endangered species and continuing commercial fishing. Involvement engages people to solicit their ideas and comments to help direct conservation ideas and participate meaningfully in decision-making processes. Parties that demonstrate

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Figure 1. Geographical locations of proposed management measures for the pound net fishery in the Virginia Chesapeake Bay. The striped area depicts where status quo would be retained (prohibition of leaders with greater than or equal to 12 inches stretched mesh and leaders with stringers), and the crosshatched area shows where all offshore leaders would be prohibited. Nearshore leaders found in the crosshatched area would not be prohibited, instead they would be subject to the status quo leader mesh size restrictions.

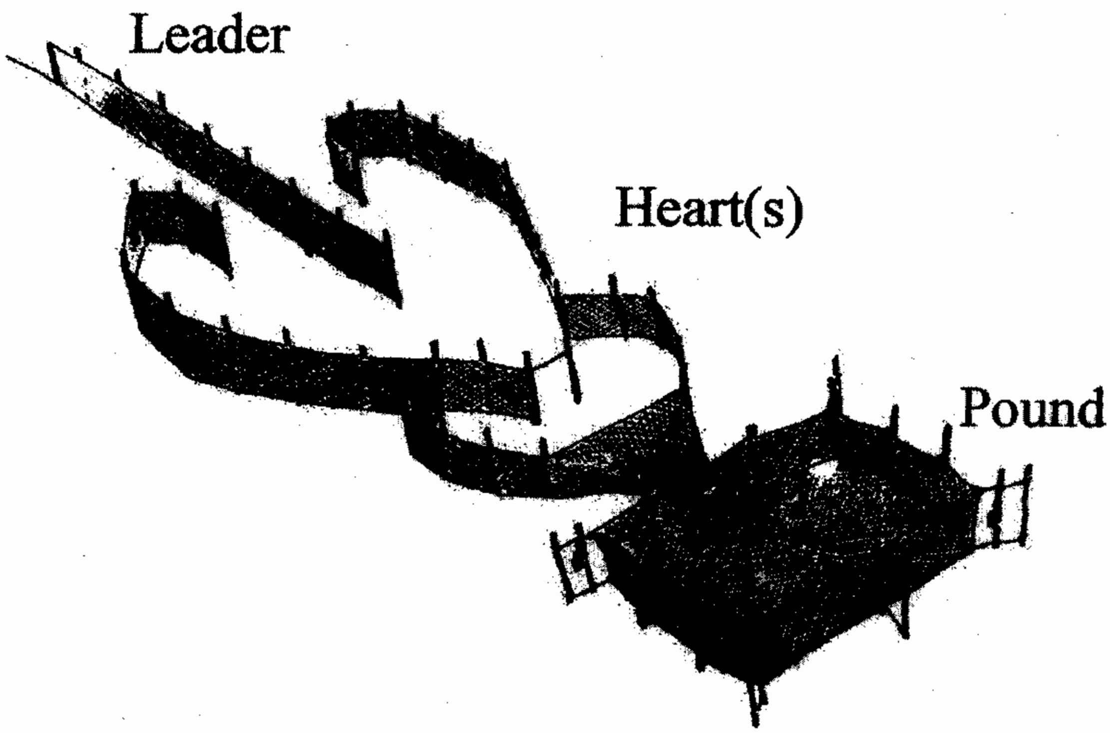

Figure 2. Configuration of a pound net (leader, heart and pound). From Mansfield et al. (2001), adapted from Austin et al. (1998).

Figure 4. Locations of documented pound net stands in the spring of 2003, depicting the active, inactive and unknown status pound net sites in the Virginia Chesapeake Bay. The locations of documented sea turtle entanglements and/or impingements are also noted. Data collected by the NOAA Fisheries Northeast Fisheries Science Center.

Figure 5. Locations of documented pound net stands and associated sampling effort in the Virginia Chesapeake Bay during the spring of 2003. Data collected by the NOAA Fisheries Northeast Fisheries Science Center.

Appendix A. Landings data provided by the Virginia Marine Resources Commission show that the following species have been landed in pound nets:

Alewife (*Alosa pseudoharengus*)

Bluefish (*Pomatomus saltatrix*)

Bonito (*Sarda sarda*)

Butterfish (*Peprilus tricanthus*)

Cobia (*Rachycentron canadum*)

Catfish (*Arius* or *Bagre spp.*)

Cod (*Gadus morhua*)

Atlantic Croaker (*Micropogonias undulatus*)

Black Drum (*Pogonius cromis*)

Red Drum (*Sciaenops ocellatus*)

American Eel (*Anguilla rostrata*)

Winter Flounder (*Pseudopleuronectes americanus*)

Summer Flounder (*Paralichthys dentatus*)

Harvest Fish (*Peprilus alepidotus*)

Atlantic Herring (*Clupia harengus*)

Spotted Seatrout (*Cynoscion nebulosus*)

Sheepshead (*Archosargus probatocephalus*)

Spanish Mackerel (*Scomberomorus maculates*)

White Perch (*Morone Americana*)

Red hake (*Urophycis chuss*)

Silver Hake (*Merluccius bilinearis*)

Amberjack (*Seriola spp.*)

Spadefish (*Chaetodipterus faber*)

Sturgeon (*Acipenser spp.*)

Scup (*Stenotomus chrysops*)

Tautog (*Tautoga onitis*)

Spot (*Leiostomus xanthurus*)

Dogfish (*Squalus acanthias*)

Mullet (*Mugil spp.*)

Menhaden (*Brevoortia spp.*)

Hickory Shad (*Alosa mediocris*)

Striped Bass (*Morone saxatilis*)

Skipjack Tuna (*Euthynnus pelamis*)

Gizzard Shad (*Dorosoma cepedianum*)

Northern Puffer (*Sphoeroides maculates*)

Little Tunny (*Euthynnus alletterathus*)

WHITING, KING	185	94	0	0	167	85
WINDOWPANE-SAND DAB	0	0	0	0	10	10
FISH, OTHER (FOOD)	0	0	0	0	422	211
FISH, OTHER (INDUSTRY)	624	393	0	0	496032	35225
TOTAL FINFISH	456603	262975	1224020	1445378	4242969	3714187

SPECIES	JANUARY		FEBRUARY		MARCH	
SHELLFISH	POUNDS	VALUE ($)	POUNDS	VALUE ($)	POUNDS	VALUE ($)
BLOOD ARK, CLAM	589	362	637	390	1136	691
CRAB, BLUE	328544	100652	367901	100058	201724	57221
HORSESHOE CRABS	5894	2616	7997	3031	7172	2726
LOBSTER	0	0	375	1969	470	2689
OCTOPUS	1106	1758	97	145	7	7
QUAHOG, PUBLIC	24766	139201	27218	154540	31295	171053
SCALLOPS, SEA	273343	1188727	477468	2073709	1038608	4543924
SQUID (LOLIGO)	299	214	26841	15233	15506	13693
SQUIDS (UNCLASSIFIED)	0	0	93	40	215	109
WHELK (UNCLASSIFIED)	20896	37744	6104	3618	4619	2845
WHELK, CHANNEL	53470	128061	4111	9794	27	85
TOTAL SHELLFISH	708907	1599335	918842	2362527	1300779	4795043
FINFISH & SHELLFISH	1165510	1862310	2142862	3807905	5543748	8509230

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TOADFISH, OYSTER	0	0	717	1617	0	0
TRIGGERFISHES	0	0	0	0	21	6
TUNA, FALSE ALBACORE	0	0	236	60	308	77
SHARK, SANDBAR	0	0	456	251	1411	965
SHARK, BLACKTIP	0	0	0	0	24	5
SHARK, LEMON	0	0	0	0	85	0
PERCH, WHITE	4716	2914	2878	1843	3096	2179
PERCH, YELLOW	141	94	70	89	7	6
OTHER FISH (FOOD)	138	79	1	1	0	0
FISH, OTHER(INDUSTRY)	661568	47342	733683	53060	516558	38513
TOTAL FINFISH	3257191	919206	3369811	964972	2824545	773844

SPECIES	**APRIL**		**MAY**		**JUNE**	
SHELLFISH	**POUNDS**	**VALUE($)**	**POUNDS**	**VALUE($)**	**POUNDS**	**VALUE($)**
BLOOD ARK, CLAM	45	29	2	2	29	17
CRAB, BLUE	978944	366841	2090688	1395532	1714973	971660
CRAB, RED	22	0	0	0	0	0
HORSESHOE CRABS	164	64	1882	718	3094	1271
QUAHOG, PUBLIC	24051	158324	34919	194170	38628	220670
WHELK (UNCLASSIFIED)	8191	3693	58089	81183	38324	43559
TOTAL SHELLFISH	1011417	528951	2185580	1671605	1795048	1237177
FINFISH & SHELLFISH	4268608	1448157	5555391	2636577	4619593	2011021

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